In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 2: Community Area reports

MA05: Risley to Bamfurlong

M20

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Department for Transport

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Contents

Tables

Figures

Preface

The Environmental Statement

This document forms part of Volume 2 of the Environmental Statement (ES) that accompanies the deposit of the High Speed Rail (Crewe – Manchester) hybrid Bill (hereafter referred to as the Bill). This Bill would authorise:

- the Phase 2b Western Leg, which comprises the section of the proposed High Speed Two (HS2) rail network from Crewe to Manchester, with connections onto the West Coast Main Line;
- a number of works that are required beyond the route, such as to the existing conventional rail network, to enable the operation of the Western Leg; and
- provision for future Northern Powerhouse Rail services to connect with HS2.

Collectively, these are referred to in this ES as 'the Proposed Scheme'. The ES describes the Proposed Scheme and reports its likely significant environmental effects and the measures proposed to mitigate adverse effects.

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. The Phase One hybrid Bill received Royal Assent in February 2017. The main works on Phase One commenced in April 2020.

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. The Phase 2a Bill received Royal Assent in February 2021.

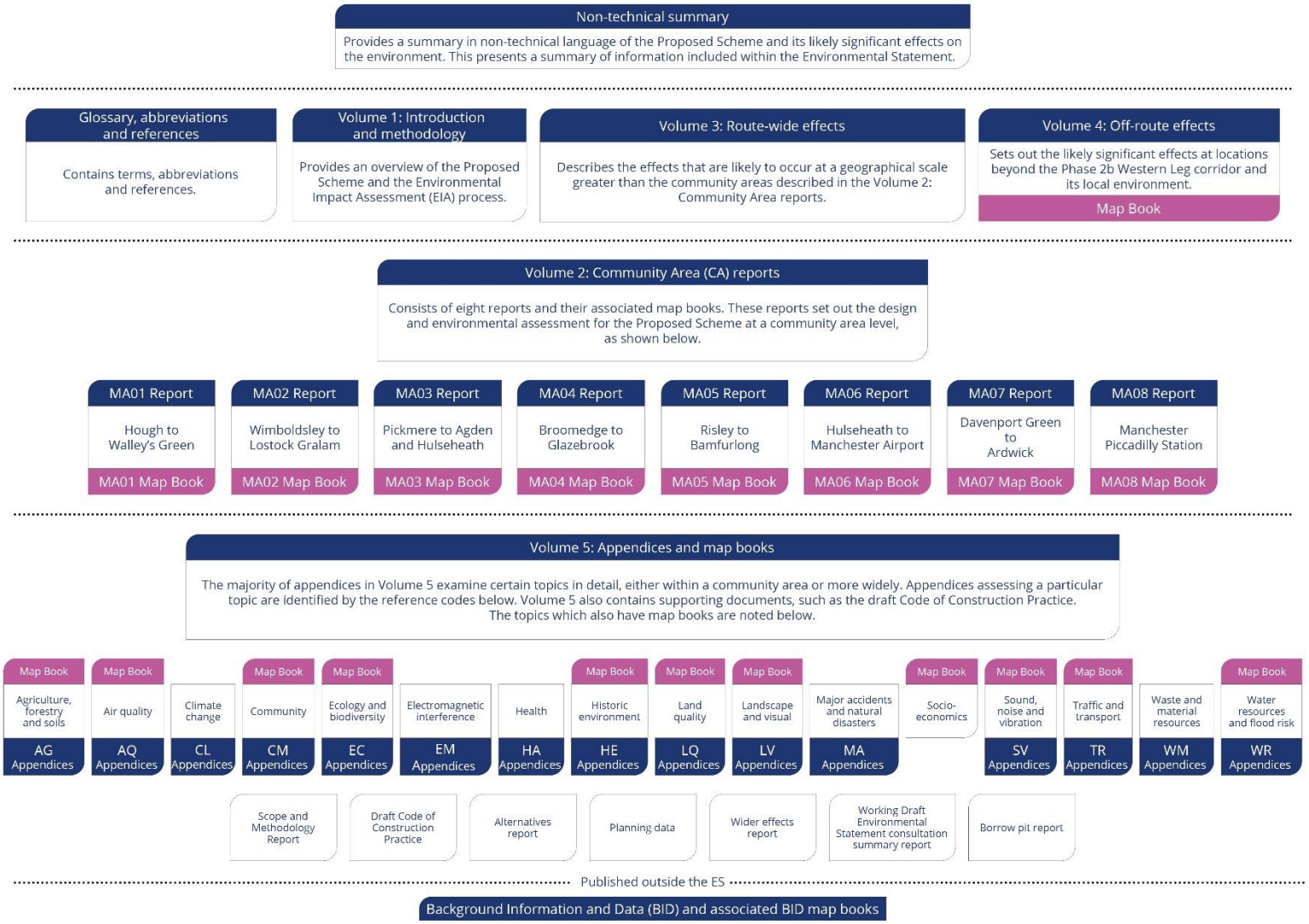
Consultation on the Environmental Statement

The public has an opportunity to comment on this ES which accompanies the deposit of the Bill. The period of public consultation on the ES extends for at least 56 days (eight weeks) after the first newspaper notices that follow deposit of Bill documents in Parliament.

Structure of the Environmental Statement

This report is part of the suite of documents that make up the ES for the Proposed Scheme. The structure of the ES is shown in Figure 1 and described in more detail in Volume 1. The ES has been prepared by persons who have sufficient expertise to ensure the completeness and technical quality of the statement.

Figure 1: Structure of the 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. It will transform intercity and long distance passenger rail travel in the UK, providing the first major increase in intercity rail capacity for over a century and freeing up substantial capacity for rail travel and freight on the conventional rail network. London, Birmingham, Manchester and cities in the Midlands, the North and Scotland will be served by high speed trains running at speeds of up to 360kph (225mph) on HS2 lines and on the existing conventional rail network. As part of the Proposed Scheme, new stations will be built at Manchester Piccadilly and Manchester Airport, in addition to the new stations in London and the West Midlands included in HS2 Phase One.

1.1.2 The Proposed Scheme that is the subject of this ES consists of:

- the HS2 Western Leg from Crewe to Manchester, including:
  - new stations at Manchester Airport and Manchester Piccadilly;
  - a depot north of Crewe;
  - maintenance facilities north of Crewe and at Ashley; and
  - a connection onto the West Coast Main Line (WCML) near Bamfurlong;
- the Crewe Northern Connection, connecting the route of the Proposed Scheme with the WCML and enabling future Northern Powerhouse Rail (NPR) services to connect with HS2;
- provision for the NPR London to Liverpool, Manchester to Liverpool, and Manchester to Leeds junctions, to enable these future NPR routes to connect with HS2; and
- a number of works at locations beyond the Western Leg route corridor, referred to as 'off-route works', which include:
  - works to enable HS2 trains to call at existing stations further north on the WCML; and
  - construction of depots to provide overnight stabling for HS2 trains serving the north of England and Scotland.

1.1.3 The Proposed Scheme will connect with HS2 Phase 2a at Hough, to the south of Crewe.

1.1.4 Construction of the Proposed Scheme is assumed to commence in 2025, with operation assumed to start in 2038.

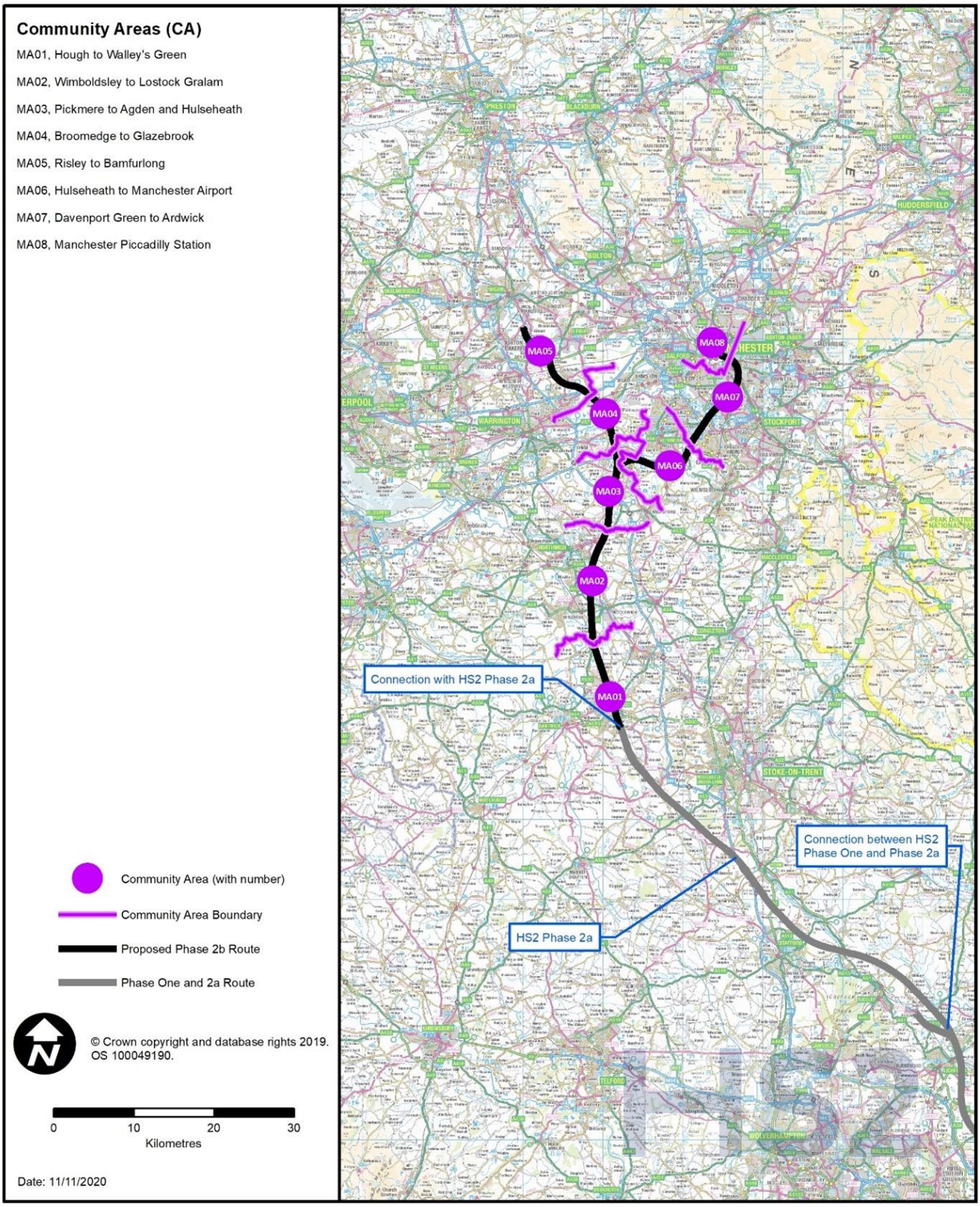
1.1.5 The environmental effects of the Proposed Scheme have been assessed. The findings of the assessment are reported in the ES, of which this Volume 2 report forms a part. The ES has been deposited alongside the Bill, in accordance with the requirements of Parliamentary

Standing Order 27A (SO27A)[1]. A working draft ES was consulted on during the development of the Phase 2b proposals to help inform the design and assessment of the Proposed Scheme.

1.1.6 For environmental assessment and community engagement purposes, the Proposed Scheme has been divided into eight community areas (CA). These are shown in Figure 2. This CA report relates to the Risley to Bamfurlong area (MA05).

[1] House of Commons (2019), *Standing Order 27A of the Standing Orders of the House of Commons relating to private business (environmental assessment)*, House of Commons. Available online at: https://www.parliament.uk/business/publications/commons/sessional-orders-private1/.

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



1.2 Purpose of this report

1.2.1 This report presents the likely significant effects of the construction and operation of the Proposed Scheme on the environment within Risley to Bamfurlong area. The report also describes the proposed means to avoid, prevent, reduce or, if possible, offset the likely significant effects of the Proposed Scheme on the environment within the area, along with any proposed monitoring measures.

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

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

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

1.3.3 Environmental effects have been assessed in accordance with the scope, methodology, assumptions and limitations set out in Volume 1 and the EIA Scope and Methodology Report (SMR)[2]. Volume 1 also sets out assumptions relating to the impact of Covid-19 on the environmental baseline.

1.3.4 The maps relevant to the Risley to Bamfurlong area are provided in a separate corresponding document entitled Volume 2: MA05 Map Book, which should be read in conjunction with this report. The maps contain grid references that are referred to in this report to enable features to be located.

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: MA05 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and other details within the limits shown on the plans and sections submitted to Parliament and as set out in the Bill, and this flexibility is included within the scope of the environmental assessment. Further explanation is provided in Volume 1, Section 1.

1.3.6 In addition to the environmental topics covered in Sections 4 to 15 of this report, climate change, electromagnetic interference, major accidents and disasters, and waste and material resources are addressed in Volume 3 on a route-wide basis. An assessment of potential environmental effects beyond the route corridor and its associated local environment has also been undertaken and this 'off-route' assessment is reported in Volume 4.

1.3.7 Supporting technical information, including technical appendices and map books, relating to the assessment in this Volume 2 report is provided in Volume 5 of the ES.

1.3.8 In addition to the technical appendices and map books in Volume 5, certain reports and maps containing Background Information and Data (BID) have been produced, which do not form part of the ES. These documents are available on the HS2 Ltd website (www.hs2.org.uk). The BID reports and maps present survey information, collated from published and unpublished sources, and other background data, and are referenced at various places within the ES.

[2] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

2 Overview of the area and description of the Proposed Scheme

2.1 Overview of the area

General

2.1.1 The Risley to Bamfurlong area covers an approximately 12.7km section of the route of the Proposed Scheme in Cheshire and Greater Manchester. The route will pass through the parishes of Birchwood, Croft, Culcheth and Glazebury. Warrington Borough Council (WBC) and Wigan Metropolitan Borough Council (WMBC) are the local authorities in the area.

2.1.2 The route of the Proposed Scheme will continue north where it will connect with the West Coast Main Line (WCML) near Bamfurlong, at the northern end of this area. There will be associated works to the WCML to facilitate connection to the route of the Proposed Scheme.

2.1.3 The southern boundary of the Risley to Bamfurlong area is formed by the boundary between the parishes of Rixton-with-Glazebrook and Birchwood. The connection to the WCML forms the northern extent of the Proposed Scheme in the area.

2.1.4 The Broomedge to Glazebrook area (MA04) lies to the south with the existing WCML to the north, as shown in Figure 3.

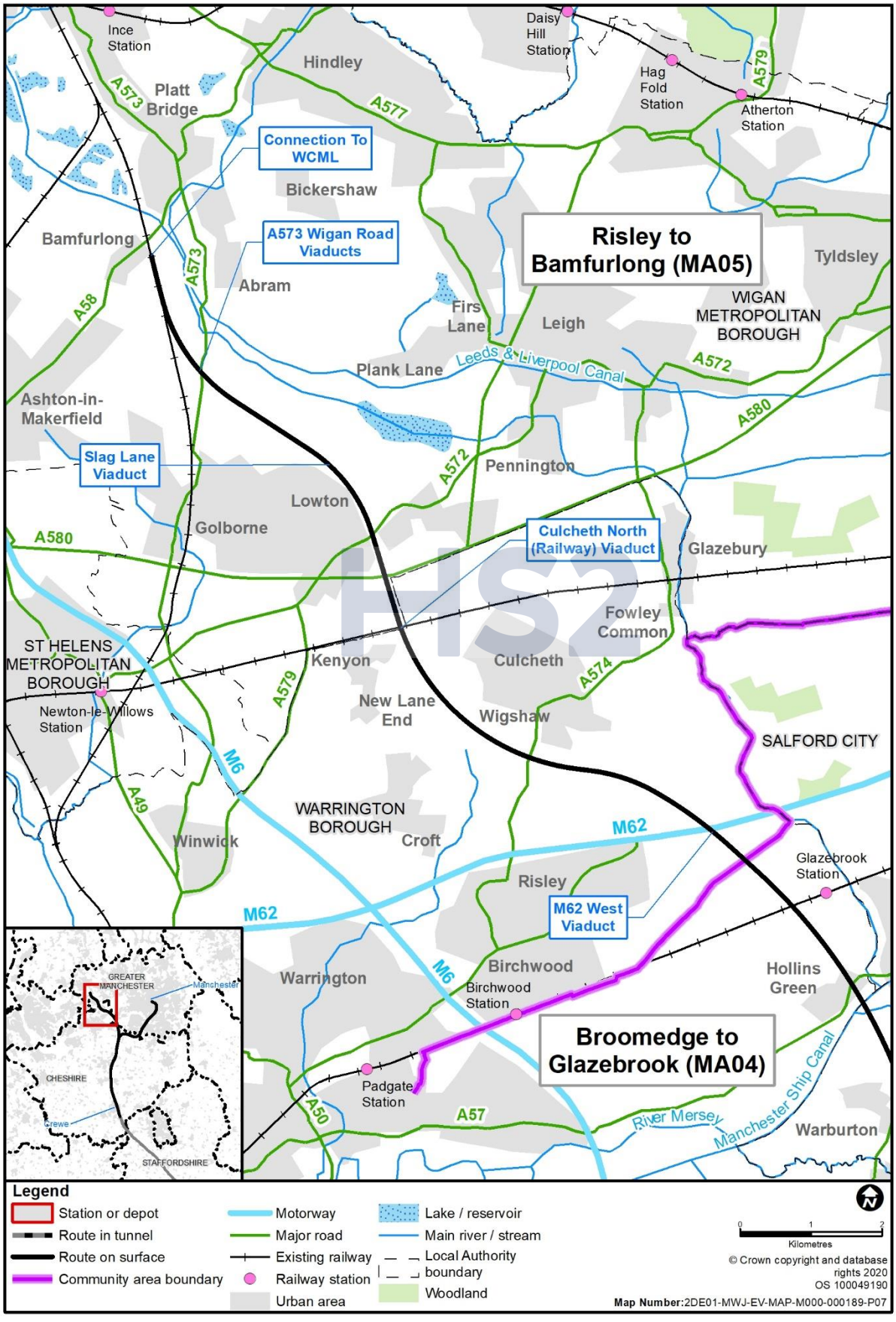
Settlement, land use and topography

2.1.5 The Risley to Bamfurlong area is predominantly rural in character, with agriculture being the main land use.

2.1.6 The main settlements are Warrington (including the suburbs of Birchwood), Risley, Lowton, Golborne, Pennington (a suburb of Leigh), Ashton-in-Makerfield, Ince-in-Makerfield and Wigan. There are also a number of villages in the area including Culcheth and Wigshaw. The villages of Bamfurlong, Abram and Platt Bridge, are suburbs of the larger town of Wigan. These settlements are interspersed with woodland, isolated dwellings and farmsteads throughout the area.

2.1.7 The area is mainly flat in the south and gently undulating in the north. The highest point is located to the south of Lowton (42m above Ordnance Datum (AOD)); the lowest point is located to the east of Birchwood (20m AOD) in the south.

Figure 3: Community area context map



Key transport infrastructure

2.1.8 Principal highways within the Risley to Bamfurlong area include the M6, the M62 and the A580 East Lancashire Road. Other main highways include the A574 Warrington Road, the A579 Atherleigh Way, the A572 Newton Road, the A573 Wigan Road and the A58 Lily Lane.

2.1.9 The WCML runs through the western part of the Risley to Bamfurlong area, in a north-south direction. The Liverpool to Manchester Line (Chat Moss) is located to the south of the A580 East Lancashire Road running in an east-west direction.

2.1.10 The Leeds and Liverpool Canal runs across the northern section of the area between Abram and the north of Lowton. It crosses the WCML north of the Risley to Bamfurlong area, to the north of Bamfurlong.

2.1.11 The route of the Proposed Scheme will cross several public rights of way (PRoW) in the area, which provide important links between surrounding settlements and access to the countryside. National Cycle Route 55 is in the north of the area[3].

Socio-economic profile

2.1.12 The professional, scientific and technical sector accounts for the largest proportion of businesses within the WBC area (24%) followed by the business administration and support services (12%) and construction (10%) sectors. The construction sector also accounts for the largest proportion of businesses within the WMBC area (15%) followed by the professional, scientific and technical (12%) and retail (10%) sectors[4].

2.1.13 According to the Annual Population Survey (2020)[5], the employment rate (the proportion of residents aged 16-64 in employment) within the WBC and WMBC area was 80% (103,200 people) and 77% (157,000 people), respectively. The unemployment rate was 3% in the WBC area and 4% in the WMBC area in 2020.

2.1.14 The same survey indicates that 42% of residents aged 16-64 in the WBC area were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 5% of residents had no qualifications. In the WMBC area 31% of residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 9% of residents had no qualifications.

[3] Two footpaths, Footpath Ashton-in-Makerfield 25/10 and Footpath Golborne 03/10, are crossed by the Proposed Scheme in the Risley to Bamfurlong area. These footpaths are understood to be inaccessible and not in use due to them being severed by the WCML. Therefore, neither footpath has been considered further in the design, nor the assessment.

[4] Office for National Statistics (2020), *UK Business Counts*. Available online at: http://www.nomisweb.co.uk/datasets/idbrlu. Local units by industry and employment size band.

[5] Office for National Statistics (2020), *Annual Population Survey*. Available online at: http://www.nomisweb.co.uk/datasets/apsnew. This includes the jobs held by residents of WBC and WMBC irrespective of where they work.

Notable community facilities

2.1.15 The main concentrations of community facilities are centred in the larger settlements of Birchwood and Risley, Culcheth, Golborne and Lowton, Pennington (a suburb of Leigh) and Ashton-in-Makerfield. A smaller number of local services are also provided in Croft (including Little Town) and Wigshaw, New Lane End and Kenyon, Fowley Common, Bamfurlong, Abram, Bickershaw and Platt Bridge, which are smaller villages and hamlets.

2.1.16 Birchwood, a suburb of Warrington, has a range of community facilities such as primary schools, as well as the Fox Wood School for children with special educational needs, a secondary school, a college, along with retail units and places of worship. Birchwood is also home to Gorse Covert Day Centre for adults with learning and physical disabilities.

2.1.17 Notable community facilities within the village of Culcheth are mainly clustered around the A574 Warrington Road and the B5207 Common Lane and comprise primary schools, a high school, a sports club with various facilities, a junior football club, and a youth and community centre. HMP Risley is located on the A574 Warrington Road, south of Culcheth.

2.1.18 Notable community facilities within the towns of Golborne and Lowton comprise several nurseries, places of worship, primary schools and secondary schools, including: Lowton Junior and Infant School, Lowton St Mary's Church of England Primary School and Nursery, St Luke's Church of England Primary School, Lowton West Primary School, Golborne High School, Lowton Church of England High School, Lowton Children's Centre, Lowton Youth and Community Centre, a gymnasium and Hesketh Meadows Playing Fields.

2.1.19 Ashton-in-Makerfield is a town with a range of community facilities including nurseries, primary schools and secondary schools, including Landgate School for children with special educational needs and Cansfield High Specialist Language College. There is also a youth and community centre.

2.1.20 Notable community resources within the village of Abram include St John's Church of England Primary School, Abram Community Centre, Abram St John the Evangelist Parish Church and three recreation grounds.

2.1.21 Bamfurlong has a range of community facilities, including Abram Bryn Gates Primary School, Bamfurlong Methodist Church, Church of the Good Shepherd, Bryn Hall public house and Bamfurlong Recreation Ground.

Recreation, leisure and open space

2.1.22 The Glazebrook Timberland Trail is a route that is promoted as a destination for recreation, which is east of the route of the Proposed Scheme and links Pennington Flash Country Park to the Manchester Ship Canal in Cadishead (in the Broomedge to Glazebrook area (MA04)).

2.1.23 Waterways in the area include the Leeds and Liverpool Canal, which passes between Pennington and Leigh to the north-east of the route of the Proposed Scheme and then north towards Abram.

2.1.24 Open space in the area includes Risley Moss Country Park and Local Nature Reserve (LNR), Gorse Covert Mounds, Birchwood Forest Park and Culcheth Linear Park. The Greenheart Regional Park also offers promoted routes for walkers, cyclists and horse riders, and links a series of Greenheart sites, comprising Pennington Flash Country Park and LNR, Byrom Wood, Leeds and Liverpool Canal, Viridor Wood and the Three Sisters Recreation Area and LNR. Recreation and leisure facilities include Partridge Lakes Fishery, Hesketh Meadows Playing Fields, a recreation ground in Bamfurlong and Leigh Golf Club, which includes the golf course and the Grade II listed Kenyon Hall clubhouse.

Policy and planning context

2.1.25 Volume 1 provides an overview of the case for HS2.

Planning framework

2.1.26 Relevant development plan documents and other planning policies have been considered in relation to environmental topics, as part of considering the Proposed Scheme in the local context. Development plan documents and other planning policies relevant to the Risley to Bamfurlong area are listed in Volume 5: Appendix CT-004-00000, Planning data. These have been considered and referred to where appropriate to the assessment described in Sections 4 to 15 of this Volume 2 report.

Committed development

2.1.27 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. Section 7 of Volume 1 sets out the approach to identifying and considering committed developments in the assessment. The committed developments relevant to the assessment of the Proposed Scheme in the Risley to Bamfurlong area are listed in Volume 5: Appendix CT-004-00000, Planning data and are shown in Volume 5, Planning Data/Committed Development Map Book: maps CT13-314b to CT-13-318.

2.1.28 These have been considered to determine whether they would result in a material change to the future baseline or have the potential to give rise to cumulative effects for each environmental topic. The committed developments considered in the assessment for the Risley to Bamfurlong area are reported in the relevant topic sections of this report.

Changes to the design since the working draft ES

2.1.29 A number of changes have been introduced to the Proposed Scheme in this area since the working draft ES was published. The key changes in this area (including approximate dimensions where appropriate) are as follows:

- the length of M62 West viaduct has been extended from 70m to 830m (of which 728m will be in this area and the remainder in the Broomedge to Glazebrook area (MA04)) to

help avoid impacts on the local groundwater at Holcroft Moss Site of Special Scientific Interest (SSSI). As a result of this change, the Glazebrook embankment adjacent to Holcroft Moss has been removed from this area (see Volume 2: MA05 Map Book, map CT-06-326b, H5 to map CT-06-327, C7);

- changes to the WCML connection (see Volume 2: MA05 Map Book, map CT-06-333, F3 to J4):
  - WCML southbound line will be realigned 23m east of its current alignment rather than 100m and will cross under the northbound route of the Proposed Scheme through WCML box structure[6];
  - the height of the route of the Proposed Scheme will be reduced by 5m between A573 Wigan Road viaducts and the connection to the WCML;
- the height of Culcheth North embankment has been reduced by 5m in the region of the golf course at Leigh Golf Club (see Volume 2: MA05 Map Book, map CT-06-329, F4 and F5 to C5);
- the height of Aye Bridge embankment and Abram embankment and retaining walls has been reduced from 18m to 13m due to changes at the WCML connection (see Volume 2: MA05 Map Book, map CT-06-333, D3 to G4);
- further design development has resulted in the following design changes to public roads:
  - the A573 Wigan Road realignment has been changed to a new alignment west of the existing A573 Wigan Road including the replacement of the previously proposed A573 Wigan Road overbridge with the A573 Wigan Road viaducts. This change will avoid the demolition of farm buildings and reduce landscape and visual impacts and severance of agricultural land (see Volume 2: MA05 Map Book, map CT-06-332, H2 to map CT-06-333, E7);
  - realignment of the A574 Warrington Road to the east of its existing alignment, avoiding demolition of property and direct impacts to Culcheth Athletic Junior Football Club (see Volume 2: MA05 Map Book, map CT-06-328, H2 to H9);
  - Wigshaw Lane will not be closed and will instead be realigned to connect to the proposed Culcheth Link Road and the existing Wigshaw Lane by a four-arm roundabout on the north side of the route of the Proposed Scheme before crossing the route on Wigshaw Lane overbridge (see Volume 2: MA05 Map Book, map CT-06-329, B7);
  - Wigshaw Lane realignment will re-connect with the existing Wigshaw Lane on the south side of the route of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-329, C2);
- footpath underbridges and culverts have been combined in four locations, so that the footpaths and watercourses will cross the route of the Proposed Scheme through a

[6] A box structure is a linear reinforced concrete structure with a solid roof and pillars on either side to carry an operational railway line over and connect to another operational railway line.

combined underbridge and culvert structure that will convey both the diverted footpath and realigned watercourse in a separate channel:

  - Footpath Croft 13 accommodation underbridge (see Volume 2: MA05 Map Book, map CT-06-327, I7);
  - Footpath Golborne 63/10 underbridge and Small Book culvert (see Volume 2: MA05 Map Book, map CT-06-331, D5);
  - Footpath Golborne 31 underbridge and Critchley culvert (see Volume 2: MA05 Map Book, map CT-06-332, C6);
  - Footpath Golborne 27/10 underbridge and Windy Bank culvert (see Volume 2: MA05 Map Book, map CT-06-332, I6);

- two auto-transformer stations - Warrington Road and Slag Lane auto-transformer stations have been relocated and re-named to M62 and B5207 Wilton Lane auto-transformer stations (see Volume 2: MA05 Map Book, map CT-06-327 E8 and map CT-06-330 D4);
- introduction of utility works including the diversion of National Grid gas pipelines, Electricity North West overhead or underground power lines and telecommunication cables, and United Utilities water and sewerage assets throughout the Risley and Bamfurlong area, as described in Section 2.2;
- introduction of two railway systems satellite compounds as described in Section 2.3 (see Volume 2: MA05 Map Book, map CT-05-332, H2 and map CT-05-334, C4);
- the removal of three railway systems compounds (see Volume 2: MA05 Map Book, map CT-05-328 H6 to I7, map CT-05-331 G6 and map CT-05-332 B8); and
- introduction of four telecommunication sites as described in Section 2.2 (see Volume 2: MA05 Map Book, map CT-06-329 A5, map CT-06-331 E5, map CT-06-332 H6 and map CT-06-333 J5).

2.1.30 In addition, the location and layout of construction compounds, stockpiles and site haul routes have been considered as part of the development of the design. Mitigation such as noise barriers, landscape earthworks, compensatory planting and replacement ponds and wetlands have also been included throughout the Risley to Bamfurlong area to reduce adverse effects from the Proposed Scheme.

2.2 Description of the Proposed Scheme

General

2.2.1 The following section describes the main features of the Proposed Scheme in the Risley to Bamfurlong area, including the proposed environmental mitigation measures that have been identified. 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. Some of the ecological mitigation described in this section

has been provided on a precautionary basis. This is described in Section 7, Ecology and biodiversity.

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 required for construction is described in Section 2.3 and shown on Volume 2: Map Series CT-05.

Overview

2.2.3 The route of the Proposed Scheme through the Risley to Bamfurlong area will be approximately 12.7km long. The route will extend from the parish boundaries of Rixton-with-Glazebrook and Birchwood and travel north before connecting with the WCML, south of Bamfurlong.

2.2.4 This section of route is illustrated on maps CT-06-326b to CT-06-334 in the Volume 2: MA05 Map Book.

2.2.5 All dimensions in the sections below are approximate.

2.2.6 The route of the Proposed Scheme will consist of 1.1km of viaducts, 7.6km of embankments and 4km of cuttings in the Risley to Bamfurlong area.

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

2.2.8 In general, the Proposed Scheme is described from south to north.

2.2.9 In addition to the features described below, the Proposed Scheme in the area will also include maintenance access points and routes, and hedgerow planting. There will also be additional utilities works in the area, which may include works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables. Note that the modifications to minor utilities described below are generally not included on the Volume 2 maps.

M62 West viaduct to the A574 Warrington Road

2.2.10 The route of the Proposed Scheme will continue from the Broomedge to Glazebrook area (MA04) north-west on M62 West viaduct and will cross the M62. It will continue north-west towards Culcheth, on Culcheth South embankment. The Proposed Scheme will then enter Culcheth cutting, passing the Taylor Business Park before crossing under the realigned A574 Warrington Road.

2.2.11 This section of route is illustrated on maps CT-06-326b to CT-06-328 in the Volume 2: MA05 Map Book.

2.2.12 Key features of this 3.3km section will include:

- continuation of M62 West viaduct, 728m in length and up to 11m in height in this section, crossing the M62 (see Volume 2: MA05 Map Book, map CT-06-326b, H5 to map CT-06-327, C7);

- an area of wetland habitat creation to the east of the Proposed Scheme and to the west of Holcroft Moss SSSI, to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-326b, H5 to map CT-06-327, A7 to B8);
- diversion of a section of an underground Cadent Gas high pressure gas pipeline, for 540m in this section, to pass under the route of the Proposed Scheme 350m south of Glazebrook South embankment in the Broomedge to Glazebrook area (MA04). The diversion works in this area will include the decommissioning of a section of the existing pipeline, which crosses Holcroft Moss SSSI. No excavation works will be undertaken in the SSSI. After decommissioning, the existing pipeline under Holcroft Moss will be left in place (see Volume 2: MA05 Map Book, map CT-06-326b, I9 to H9);
- two areas of landscape mitigation planting west of M62 West viaduct, to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-327, A6 to A7 and B6 to B7);
- an area of woodland habitat creation to the west of M62 West viaduct and parallel to the M62 to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-327, D5 to E3);
- realignment of the M62 comprising widening of the central reservation by 5m over a length of 623m, east of junction 11 to accommodate a pier for M62 West viaduct, with a negligible change in journey length (see Volume 2: MA05 Map Book, map CT-06-327, A9 to D5);
- Culcheth South embankment, 2.1km in length and up to 9m in height, with associated landscape mitigation planting on both sides to help integrate the Proposed Scheme into the surrounding landscape and to provide visual screening for residents of properties along the B5212 Holcroft Lane and footpath users (see Volume 2: MA05 Map Book, map CT-06-327, C7 to map CT-06-328, D6);
- an area of woodland habitat creation to the east of the Proposed Scheme, north of the M62 to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-327, B8);
- an area of woodland habitat creation west of the Proposed Scheme and adjacent to M62 West viaduct to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-327, C7 to D6);
- closure of an access road to Franks Farm where it crosses the route of the Proposed Scheme. Access will be provided via Risley East accommodation underbridge increasing journey length by 160m (see Volume 2: MA05 Map Book, map CT-06-327, D7);
- M62 auto-transformer station, 75m by 26m in area, to the east of the route of the Proposed Scheme including signalling equipment and a railway telecommunication mast up to 25m in height. Access will be provided from the M62 junction 11 (see Volume 2: MA05 Map Book, map CT-06-327, E8);
- Risley East accommodation underbridge, 16m in length, with a height clearance of 6.3m to provide access to Franks Farm and M62 auto-transformer station (see Volume 2: MA05 Map Book, map CT-06-327, F7 to F8);

- an area of woodland habitat creation along the western side of Culcheth South embankment, to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-327, F7 to H6);
- five ecological mitigation ponds to the south of the route of the Proposed Scheme, 200m west of Risley East accommodation underbridge, to provide replacement habitat for great crested newt, within an area of grassland habitat creation (see Volume 2: MA05 Map Book, map CT-06-327, G7 to H5);
- diversion of a section of an underground National Grid 1,050mm high pressure gas pipeline, for 382m in length, to pass under the route of the Proposed Scheme, 620m north of the M62 (see Volume 2: MA05 Map Book, map CT-06-327, G7 to I8);
- realignment of a section of Tributary of Holcroft Lane Brook 1 for 17m, up to 5m south-west of its existing alignment (see Volume 2: MA05 Map Book, map CT-06-327, H7);
- Footpath Croft 13 accommodation underbridge, 13m in length, with a height clearance of 6.5m to provide access for Ratcliffe Hall Farm and to convey the realigned section of Tributary of Holcroft Lane Brook 2 and diverted section of Tributary of Holcroft Lane Brook 3 in a separate channel under Culcheth South embankment (see Volume 2: MA05 Map Book, map CT-06-327, I7);
- realignment of a section of Footpath Croft 13, and provision of accommodation access for Ratcliffe Hall Farm, up to 352m south-west of its current alignment for 1.5km, to cross the route of the Proposed Scheme through Footpath Croft 13 accommodation underbridge. This will increase journey length by 884m (see Volume 2: MA05 Map Book, map CT-06-327, G4 to J8);
- realignment of a section of Tributary of Holcroft Lane Brook 2 (known locally as Silver Lane Brook) and diversion of a section of Tributary of Holcroft Lane Brook 3 for 360m, 65m east of their existing alignments crossing under Culcheth South embankment through Footpath Croft 13 accommodation underbridge (see Volume 2: MA05 Map Book, map CT-06-327, I7 to J8);
- Holcroft Lane Brook offline culvert, 62m north-east of Culcheth South embankment for surface water flow from the realigned Tributary of Holcroft Lane Brook 2 and diverted Tributary of Holcroft Lane Brook 3 under a maintenance access route (see Volume 2: MA05 Map Book, map CT-06-327, I8);
- diversion of a section of Footpath Croft 28, up to 140m south-east of its current alignment for 630m. The footpath will connect with the realigned Footpath Croft 13. This will decrease journey length by 213m (see Volume 2: MA05 Map Book, map CT-06-327, H5 to J6);
- an area of wetland habitat creation, 25m to the north of Culcheth South embankment to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-327, H8 and I7 to J9);
- an area of wetland habitat creation to the south of Footpath Croft 13 accommodation underbridge to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-327, I7);

- two balancing ponds for railway drainage located 150m north-west of Culcheth South embankment and 180m to the south of the dismantled railway line. Access will be provided from Footpath Croft 13 realignment via junction 11 of the M62 (see Volume 2: MA05 Map Book, map CT-06-327, I7 and I8);
- reshaping of two of the existing Silver Lane Ponds on both sides of the route of the Proposed Scheme, to maintain capacity of the drainage system for the restored Risley Landfill. The existing pond on the eastern side will be surrounded by a new area of grassland habitat creation (see Volume 2: MA05 Map Book, map CT-06-328, A7 and B6 to D5);
- a drainage pond in an area of grassland habitat creation for the replacement of the eastern pond at Silver Lane Ponds, to maintain the capacity of the restored Risley Landfill drainage system (see Volume 2: MA05 Map Book, map CT-06-328, B7 to C7);
- landscape earthworks, up to 3m in height, beginning 350m west of Footpath Croft 13 accommodation underbridge and continuing along the north side of Culcheth South embankment. The landscape earthworks will provide visual screening for footpath users and residents of properties along the B5212 Holcroft Lane and in Culcheth and help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-328, A6 to D6);
- closure of Footpath Croft 27 where it crosses the route of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-328, B7);
- realignment of Holcroft Lane Brook, for 700m up to 25m north of its existing alignment. The watercourse will then connect to the existing alignment of the Holcroft Lane Brook (see Volume 2: MA05 Map Book, map CT-06-328, D6 to A7);
- Holcroft Lane Brook culvert, 300m south-east of Taylor Business Park, for the diversion of Tributary of Holcroft Lane Brook 4. The watercourse will be diverted for 50m, up to 210m north of its existing alignment and will cross under Culcheth South embankment to drain into the realigned Holcroft Lane Brook (see Volume 2: MA05 Map Book, map CT-06-328, D6);
- replacement floodplain storage area on the northern side of the route of the Proposed Scheme, 70m to the south of Culcheth Linear Park (see Volume 2: MA05 Map Book, map CT-06-328, A8 and B7);
- a new PRoW crossing the route of the Proposed Scheme via Holcroft Lane Brook culvert which will include a pedestrian underbridge, connecting Footpath Croft 14a with Footpath Croft 15 east of Taylor Business Park, decreasing journey length by 795m; (see Volume 2: MA05 Map Book, map CT-06-328, E4 to E7);
- three ecological mitigation ponds to the north of the route of the Proposed Scheme, within an area of terrestrial habitat, to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-328, D6 to F6);
- Culcheth cutting, 650m in length, 4m in depth and up to 46m in width, in this section, with landscape earthworks and associated landscape mitigation planting along both sides. The landscape earthworks will be up to 2m in height on the south side and up to

3m in height on the north side to provide visual screening for residents of properties in Culcheth (see Volume 2: MA05 Map Book, map CT-06-328, E6 to G6);

- diversion of an Electricity North West 33kV overhead power line for 1.4km to the north of Culcheth cutting, through Taylor Business Park and along the realigned A574 Warrington Road. The power line will be diverted to a cable sealing end compound where it transitions to underground and reconnects to existing lines (located within the area shown on Volume 2: MA05 Map Book, map CT-06-328);
- permanent diversion of a United Utilities water main to accommodate Culcheth cutting (located within the area shown on Volume 2: MA05 Map Book, map CT-06-328);
- a balancing pond for railway drainage located within an area of woodland habitat creation and landscape mitigation planting 60m south of Culcheth cutting. Access will be provided from the realigned A574 Warrington Road (see Volume 2: MA05 Map Book, map CT-06-328, E5);
- an area of woodland habitat creation 120m to the south of Culcheth cutting to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-328, E3 to E5);
- diversion of two sections of New Hall Lane within Taylor Business Park where they cross the route of the Proposed Scheme. Access to properties on the southern side of the route will be retained. Access to Taylor Business Park will be retained by the existing exit road and provision of a new junction on the realigned A574 Warrington Road. Users will be diverted along the realigned A574 Warrington Road, increasing journey length by 218m (see Volume 2: Map Book, map CT-06-328, F6 and G7);
- permanent diversion and decommissioning of minor utilities to accommodate the diversion of New Hall Lane, including Openreach underground cables and a United Utilities sewer (located within the area shown on Volume 2: MA05 Map Book, map CT-06-328);
- diversion of a section of Footpath Croft 15 (also known as New Hall Lane Path) up to 158m west of its current alignment to connect with the realigned A574 Warrington Road crossing the route of the Proposed Scheme on A574 Warrington Road overbridge. This will increase journey length by 729m (see Volume 2: MA05 Map Book, map CT-06-328, F6 to H5);
- realignment of a section of A574 Warrington Road, up to 160m east of its existing alignment on an embankment 1km long and up to 6m in height, crossing the route of the Proposed Scheme on A574 Warrington Road overbridge increasing journey length by 96m. The existing A574 Warrington Road will be closed where it crosses the route of the Proposed Scheme, with access retained on both sides of the route for the Grade II listed Newchurch Old Refectory (also known as Newchurch Old Rectory)[7], Bates and Yew Tree farms (see Volume 2: MA05 Map Book, map CT-06-328, H2 to H9);

[7] Listed as Newchurch Old Refectory and is described as a rectory: https://historicengland.org.uk/listing/the-list/list-entry/1139386.

- A574 Warrington Road overbridge, 64m in length, up to 8m above existing ground level and up to 10m above track level (see Volume 2: MA05 Map Book, map CT-06-328, G5 to G6);
- landscape mitigation planting either side of the realigned A574 Warrington Road to provide visual screening for the Grade II listed Newchurch Old Refectory (also known as Newchurch Old Rectory) and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-328, G4 to H8);
- permanent diversion and decommissioning of minor utilities to accommodate A574 Warrington Road overbridge and realignment, including Electricity North West underground cables and overhead lines, Openreach underground cables and United Utilities underground sewer and water main and Cadent Gas mains (located within the area shown on Volume 2: MA05 Map Book, map CT-06-328);
- an area of grassland habitat creation, north of the Taylor Business Park, to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-328, G7 to G8);
- an area of woodland habitat creation, north of Culcheth cutting and Taylor Business Park, to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-328, G7 to H9);
- a balancing pond for highway drainage, 480m to the south of Culcheth cutting on the southern side of the realigned A574 Warrington Road. Access will be provided from the realigned A574 Warrington Road (see Volume 2: MA05 Map Book, map CT-06-328, G2);
- realignment of the Tributary of Holcroft Lane Brook 4, for 100m up to 60m south of its existing alignment. The watercourse will then connect to the existing alignment of the Tributary of Holcroft Lane Brook 4 (see Volume 2: MA05 Map Book, map CT-06-328, G2);
- closure of Footpath Croft 18 where it crosses a maintenance access for a balancing pond. Users will be diverted along Footpath Croft 17 realignment, increasing journey length by 22m (see Volume 2: MA05 Map Book, map CT-06-328, G8);
- Footpath Croft 17 will be realigned where it crosses a maintenance access for a balancing pond, to the realigned A574 Warrington Road, increasing journey length by 54m (see Volume 2: MA05 Map Book, map CT-06-328, G8); and
- a balancing pond for highway drainage, 310m to the north of Culcheth cutting. Access will be provided from the realigned A574 Warrington Road (see Volume 2: MA05 Map Book, map CT-06-328, G8 to H9).

A574 Warrington Road to the Liverpool to Manchester Line (Chat Moss)

2.2.13 This section of the route of the Proposed Scheme will continue north in Culcheth cutting from the existing A574 Warrington Road before transitioning onto Culcheth North embankment and continuing towards the Liverpool to Manchester Line (Chat Moss).

2.2.14 This section of route is illustrated on maps CT-06-328 to CT-06-330 in the Volume 2: MA05 Map Book.

2.2.15 Key features of this 2.6km section will include:

- continuation of Culcheth cutting, 1.3km in length, up to 3m in depth and 46m in width in this section (see Volume 2: MA05 Map Book, map CT-06-328, G6 to map CT-06-329, F5);
- landscape earthworks up to 2m in height will be provided on the northern side of Culcheth cutting from New Hall Lane to the golf course at Leigh Golf Club. The landscape earthworks and landscape mitigation planting will provide visual screening for residents of properties in Wigshaw, Culcheth and along the existing A574 Warrington Road and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-328, G6 to map CT-06-329, H5);
- landscape earthworks up to 2m in height will be provided on the southern side of Culcheth cutting from New Hall Lane to the west of Wigshaw Lane realignment. The landscape earthworks and landscape mitigation planting will provide visual screening for residents of properties along the existing A574 Warrington Road, Wigshaw Lane, users of footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-328, G6 to map CT-06-329, D4);
- Culcheth Link Road, 600m in length, will run parallel to the south of Culcheth Linear Park to connect the A574 Warrington Road to the existing Wigshaw Lane by a four-arm roundabout (see Volume 2: MA05 Map Book, map CT-06-328, H8 and H9 to map CT-06-329, B7);
- diversion of a section of Footpath Croft 19 for 94m, up to 87m east of its current alignment crossing the route of the Proposed Scheme on A574 Warrington Road overbridge, increasing journey length by 861m (see Volume 2: MA05 Map Book, map CT-06-328, H7);
- closure of Glaziers Lane, where it crosses the route of the Proposed Scheme with access retained from the A574 Warrington Road to the Partridge Lakes Fishery, increasing journey length by 2.6km (see Volume 2: MA05 Map Book, map CT-06-328, H5 to J6 and map CT-06-329, B5);
- Glaziers Lane telecommunications site, 53m by 23m in area, to the south of the route of the Proposed Scheme which will include a railway telecommunication mast up to 25m in height. Access will be provided from the existing A574 Warrington Road and realigned Glaziers Lane (see Volume 2: MA05 Map Book, map CT-06-329, A5);
- landscape mitigation planting to the west and south of Glaziers Lane telecommunications site to provide visual screening for residents of properties along the existing A574 Warrington Road and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-329, A5 to B5);
- realignment of a section of Wigshaw Lane, up to 180m north-west of its existing alignment on an embankment 670m in length and up to 6m in height, crossing the route of the Proposed Scheme on Wigshaw Lane overbridge. This will increase the length of journey by 94m. The existing Wigshaw Lane will be closed where it crosses the route of the Proposed Scheme with access to properties retained on the northern side, increasing journey length by 430m (see Volume 2: MA05 Map Book, map CT-06-329, C5 to B5 and C7 to C2);

- Wigshaw Lane retaining wall, 20m in length and up to 3m above ground level located to the north-east of the route of the Proposed Scheme along the Wigshaw Lane realignment (see Volume 2: MA05 Map Book, map CT-06-329, C5);
- Wigshaw Lane overbridge, 60m in length, up to 8m above ground level and up to 9m above track level (see Volume 2: MA05 Map Book, map CT-06-329, C4 to C5);
- permanent diversion and decommissioning of minor utilities to accommodate Wigshaw Lane overbridge and realignment, including Openreach, Electricity North West underground cables and overhead lines, and a United Utilities water main (located within the area shown on Volume 2: MA05 Map Book, map CT-06-329);
- diversion of Tributary of Cross Brook 1 for 100m to the south-east along Culcheth cutting. The watercourse will discharge into an existing sewer via a swale (see Volume 2: MA05 Map Book, map CT-06-329, C5 to C4);
- landscape mitigation planting to the north of the Proposed Scheme adjacent to the Culcheth Linear Park to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-328, H8 and H9);
- an area of grassland habitat creation along the south side of Culcheth Linear Park to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-328, H9 to J8);
- a balancing pond for highway drainage, 315m to the north of Culcheth cutting and south of Culcheth Linear Park. Access will be provided from the Culcheth Link Road (see Volume 2: MA05 Map Book, map CT-06-328, H8 to I9);
- an area of woodland habitat creation along the north side of Culcheth cutting to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-329, B8 to B7);
- a balancing pond for highway drainage, 230m to the south of Culcheth cutting and west of the Partridge Lakes Fishery. Access will be provided from Wigshaw Lane realignment (see Volume 2: MA05 Map Book, map CT-06-329, C3);
- decommissioning of a United Utilities potable water main, for 1km in length, as part of the Glaziers Lane closure (located within the area shown on Volume 2: MA05 Map Book, map CT-06-329);
- diversion and decommissioning of minor utilities to accommodate the Glaziers Lane closure, including Electricity North West and Openreach underground cables and overhead lines (located within the area shown on Volume 2: MA05 Map Book, map CT-06-329);
- an area of landscape mitigation planting along the north side of Culcheth cutting to provide visual screening for residents of Wigshaw and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-329, A6 to C5);
- closure of a section of Footpath Croft 8. Users will be diverted along Wigshaw Lane realignment increasing journey length by 448m (see Volume 2: MA05 Map Book, map CT-06-329, B6 to D3);

- a balancing pond for highway drainage, 200m to the north of Culcheth cutting and south of Culcheth Linear Park. Access will be provided from Wigshaw Lane realignment (see Volume 2: MA05 Map Book, map CT-06-329, C6 to D6);
- an area of grassland habitat creation, 20m north of Culcheth cutting to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-329, E5 to F5);
- Culcheth North embankment, 1.3km in length and up to 4m in height, with associated landscape mitigation planting on the western side to provide visual screening for footpath users, residents of New Lane End and along Kenyon Lane, Heath Lane and help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-329, F5 to map CT-06-330, C5);
- an area of woodland habitat creation along the eastern side of Culcheth North embankment to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-329, F5 to map CT-06-330, C5);
- Footpath Croft 8a and 108 overbridge, 60m in length, up to 10m above existing ground level and up to 8m above track level (see Volume 2: MA05 Map Book, map CT-06-329, F4 to F5);
- realignment of a section of Footpath Croft 8a, up to 145m north-east of its current alignment for 380m, crossing the route of the Proposed Scheme on Footpath Croft 8a and 108 accommodation overbridge increasing journey length by 300m (see Volume 2: MA05 Map Book, map CT-06-329, E4 to F5);
- diversion of a section of Footpath Croft 108 and Culcheth and Glazebury 108, up to 320m south of its existing alignment for 1km, along the western side of Culcheth North embankment, crossing the route of Proposed Scheme on Footpath Croft 8a and 108 accommodation overbridge, increasing journey length by 591m (see Volume 2: MA05 Map Book, map CT-06-329, H4 to F7);
- an area of woodland habitat creation along the east side of the Culcheth Linear Park north of Footpath Croft 108 to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-329, F5 to I6);
- sixteen ecological mitigation ponds, east of Culcheth Linear Park and west of Leigh Golf Course to provide replacement habitat for great crested newt, with surrounding terrestrial habitat (see Volume 2: MA05 Map Book, map CT-06-329, F5 to I6);
- diversion of minor utilities to accommodate Culcheth North embankment, including Electricity North West underground cables and overhead lines (located within the area shown on Volume 2: MA05 Map Book, map CT-06-329);
- two balancing ponds for railway drainage, 100m to the east of Culcheth North embankment and east of Culcheth Linear Park. Access will be provided from the B5207 Broseley Lane via an access road along the south side of the Liverpool to Manchester Line (Chat Moss) (see Volume 2: MA05 Map Book, map CT-06-329, I6 and CT-06-330, C6); and
- Kenyon culvert, 150m south of the Liverpool to Manchester Line (Chat Moss), for surface water drainage under Culcheth North embankment to drain into a balancing pond and then Tributary of the Carr Brook 1 (see Volume 2: MA05 Map Book, map CT-06-330, C5).

Liverpool to Manchester Line (Chat Moss) to Lowton South embankment

2.2.16 The Proposed Scheme will continue north from the crossing of the Liverpool to Manchester Line (Chat Moss) into Lowton cutting.

2.2.17 This section of route is illustrated on maps CT-06-330 to CT-06-331 in the Volume 2: MA05 Map Book.

2.2.18 Key features of this 2km section will include:

- Culcheth North (Railway) viaduct, 52m in length, up to 14m in height and up to 4m above existing ground level, to carry the Proposed Scheme over the Liverpool to Manchester Line (Chat Moss) (see Volume 2: MA05 Map Book, map CT-06-330, C4 to C5);
- Lowton cutting, 1.8km in length, up to 10m in depth and 105m in width with associated landscape mitigation planting on both sides to provide visual screening for residents of properties on the B5207 Wilton Lane and Lowton Junior and Infant School and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-330, C5 to map CT-06-331, D5);
- B5207 Wilton Lane auto-transformer station 87m by 72m in area, to the west of the route of the Proposed Scheme and 60m to the north of the Liverpool to Manchester Line (Chat Moss), including signalling equipment and a railway telecommunications mast up to 20m in height. Access will be provided from an access road joining the realigned B5207 Wilton Lane (see Volume 2: MA05 Map Book, map CT-06-330, C4 to D4);
- diversion and decommissioning of a United Utilities water main to accommodate Lowton cutting (located within the area shown on Volume 2: MA05 Map Book, map CT-06-330);
- realignment of a section of the B5207 Wilton Lane, up to 70m north of its existing alignment on an embankment, 713m long and up to 7m in height with associated mitigation planting to help integrate the Proposed Scheme into the surrounding landscape. The realigned B5207 Wilton Lane will cross the route of the Proposed Scheme on B5207 Wilton Lane overbridge. The existing B5207 Wilton Lane will be closed where it crosses the route of the Proposed Scheme, decreasing journey length by 16m (see Volume 2: MA05 Map Book, map CT-06-330, D1 to D7);
- B5207 Wilton Lane overbridge 61m in length, up to 9m above existing ground level and track level (see Volume 2: MA05 Map Book, map CT-06-330, D4 to D7);
- diversion of a United Utilities water main to accommodate B5207 Wilton Lane overbridge (located within the area shown on Volume 2: MA05 Map Book, map CT-06-330);
- a balancing pond for highway drainage, 270m to the east of Lowton cutting and north of the realigned B5207 Wilton Lane. Access will be provided from the realigned B5207 Wilton Lane (Volume 2: MA05 Map Book, map CT-06-330, D7);
- realignment of a section of Footpath Golborne 80/10, up to 10m to the west of its existing alignment for 45m, decreasing journey length by 28m (see Volume 2: MA05 Map Book, map CT-06-330, F4 and G4);

- diversion, lowering and separating into two, an underground United Utilities 1,200mm water main, for 1.1km in length, to pass under the route of the Proposed Scheme 50m south of the A580 East Lancashire Road (see Volume 2: MA05 Map Book, map CT-06-330, F3 to G9);
- a section of the A580 East Lancashire Road will cross the route of the Proposed Scheme on A580 East Lancashire Road overbridge on its existing alignment (see Volume 2: MA05 Map Book, map CT-06-330, G4 to G6);
- A580 East Lancashire Road overbridge, 62m in length, up to 5m above existing ground level and up to 11m above track level (see Volume 2: MA05 Map Book, map CT-06-330, G5);
- diversion of minor utilities to accommodate A580 East Lancashire Road overbridge, including Electricity North West and Openreach underground cables and overhead lines and Cadent Gas mains (located within the area shown on Volume 2: MA05 Map Book, map CT-06-330);
- landscape earthworks, 530m in length and up to 3m in height with associated landscape mitigation planting, extending north from the A580 East Lancashire Road along the western side of Lowton cutting to provide visual screening for residents of properties in Lowton and the Lowton Junior and Infant School, users of footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-330, G4 to J5);
- East Lancashire Road offline culvert, 70m to the west of Lowton cutting, to convey surface water drainage under the A580 East Lancashire Road realignment (see Volume 2: MA05 Map Book, map CT-06-330, G4);
- Newton Road accommodation access along the western side of the Proposed Scheme from the A572 Newton Road to properties along the A572 Newton Road without direct access (see Volume 2: MA05 Map Book, map CT-06-330, I4 to J4);
- realignment of a section of Carr Brook for 440m, up to 90m south of its existing alignment crossing over Lowton cutting at existing ground level on Carr Brook aqueduct, 76m in length and up to 8m above track level. The watercourse will also be realigned through Newton Road access offline culvert, 300m to the north of the A580 East Lancashire Road and Golborne pumping station access culvert, 210m to the east of Lowton cutting (see Volume 2: MA05 Map Book, map CT-06-330, I4 to I7);
- a balancing pond for railway drainage on the eastern side of the Proposed Scheme to the south of Pocket Nook Lane. Access will be provided from Pocket Nook Lane (see Volume 2: MA05 Map Book, map CT-06-330, H6 to I6);
- Golborne pumping station and storage tank for railway drainage to the east of the route for the Proposed Scheme. The pumping station and storage tank will be in cutting on the eastern side of the route of the Proposed Scheme. Access will be provided from Pocket Nook Lane (see Volume 2: MA05 Map Book, map CT-06-330, H5 and I5);
- a noise fence barrier 370m in length, up to 3m in height along the top of the eastern side of Lowton cutting to provide acoustic screening for properties at Wash End and Lowton Common (see Volume 2: MA05 Map Book, map CT-06-330, H5 to map CT-06-331, A4);

- a section of the A572 Newton Road will cross the route of the Proposed Scheme on A572 Newton Road overbridge on its existing alignment (see Volume 2: MA05 Map Book, map CT-06-331, A3 to A4);
- A572 Newton Road overbridge, 72m in length, up to 3m above existing ground level and 12m above track level (see Volume 2: MA05 Map Book, map CT-06-331, A4);
- diversion and decommissioning of minor utilities to accommodate A572 Newton Road overbridge, including Electricity North West, Virgin Media and Openreach underground cables and overhead lines, United Utilities water mains and sewer and Cadent Gas mains (located within the area shown on Volume 2: MA05 Map Book, map CT-06-331);
- a noise fence barrier 510m in length and up to 3m in height in this section, located along the top of the western side of Lowton cutting to provide acoustic screening for properties in Lowton (see Volume 2: MA05 Map Book, map CT-06-331, A3 to D5);
- landscape earthworks, 360m in length and up to 3m in height in this section with associated landscape mitigation planting, on the eastern side of the route of the Proposed Scheme to provide visual screening for residents of properties at Wash End and users of Lowton Common and footpaths (see Volume 2: MA05 Map Book, map CT-06-331, B5 to D5);
- landscape earthworks, 340m in length and up to 3m in height in this section with associated landscape mitigation planting, on the western side of the route of the Proposed Scheme to provide visual screening for residents of properties in Lowton, including Green Meadow Independent Primary School, users of Lowton Common and surrounding footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-331, B4 to D5);
- an area of replacement recreational sports pitches, to the north-east of the Proposed Scheme, north of the Cheetham Fold Farm Stables and east of Lowton, to replace Hesketh Meadows Playing Fields, Lowton (see Volume 2: Map CT-06-331 C6 to D8); and
- four ecological mitigation ponds 70m to the west of Lowton cutting and east of Lowton to provide replacement habitat, with surrounding terrestrial habitat (see Volume 2: MA05 Map Book, map CT-06-331, C4 to D4).

Lowton South embankment to Lily Lane

2.2.19 The Proposed Scheme will continue in a north-westerly direction from Lowton cutting on Lowton South embankment. The route will then pass to the north of the town of Golborne before connecting with the WCML, south of Bamfurlong, which forms the northernmost extent of the Proposed Scheme.

2.2.20 This section of route is illustrated on maps CT-06-331 to CT-06-334 in the Volume 2: MA05 Map Book.

2.2.21 Key features of this 4.8km section will include:

- Lowton South embankment, 657m in length and up to 7m in height, with associated landscape mitigation planting to provide visual screening for residents of properties at

Lowton, along Sandy Lane and Byrom Lane, users of Lowton Common and surrounding footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: CT-06-331, D5 to G5);

- continuation of a noise fence barrier, 650m in length in this section and up to 2m in height, located along the top of Lowton South embankment on the south-west side, to provide acoustic screening for properties at Lowton and along Slag Lane (see Volume 2: CT-06-331 D5 to H4);
- continuation of landscape earthworks, 130m in length and up to 3m in height in this section with associated landscape mitigation planting, on both sides of the route of the Proposed Scheme to provide visual screening for residents of properties at Wash End, and Lowton, including Green Meadow Independent Primary School, users of surrounding footpaths, Lowton Common and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-331, D5);
- an area of landscape mitigation planting to the south-west of Lowton South embankment to provide visual screening for Warrens Croft Farm and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-331, D5 to G5);
- Footpath Golborne 63/10 underbridge and Small Brook culvert, a combined structure comprising a concrete box segregated for pedestrian access and the watercourse, 7m in length and with a height clearance of 4m, 350m to the north-west of Warrens Croft Farm, (see Volume 2: MA05 Map Book, map CT-06-331, E5 to F5);
- realignment of a section of Footpath Golborne 63/10, up to 75m south-east of its current alignment for 270m, crossing the route of the Proposed Scheme through Footpath Golborne 63/10 underbridge and Small Brook culvert, increasing journey length by 124m (see Volume 2: MA05 Map Book, map CT-06-331, E5 to E6);
- realignment of a section of Small Brook, 25m north of its existing alignment, for 225m, crossing the route of the Proposed Scheme, referred to as Footpath Golborne 63/10 underbridge and Small Brook culvert (see Volume 2: MA05 Map Book, map CT-06-331, D4 to D6);
- diversion of a United Utilities water main to accommodate Footpath Golborne 63/10 underbridge and Small Brook culvert (see Volume 2: MA05 Map Book, map CT-06-331, D5 to E5);
- a balancing pond for railway drainage to the north-east of Lowton South embankment and north of Footpath Golborne 63/10 underbridge and Small Brook culvert. Access will be provided from the realigned Slag Lane (Volume 2: MA05 Map Book, map CT-06-331, E5 to E6);
- Slag Lane telecommunications site 49m by 24m in area, to the north-east of the route of the Proposed Scheme and 500m south-east of the realigned Slag Lane, including a railway telecommunications mast up to 20m in height and associated mitigation planting. Access will be provided from the realigned Slag Lane (see Volume 2: MA05 Map Book, map CT-06-331, E5 to E6);

- an area of landscape mitigation planting, along a dismantled railway line for 550m, 170m south-west of Lowton South embankment to provide visual screening for residents of properties in Lowton, users of footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-331, E4 to G2);
- diversion of a section of an underground United Utilities 457mm potable water main, for 395m in length, to pass under the route of the Proposed Scheme 230m east of Warrens Croft Farm (see Volume 2: MA05 Map Book, map CT-06-331, E5 to E6);
- diversion of a section of Footpath Golborne 39/10, up to 315m north-west of its current alignment for 270m, crossing the route of the Proposed Scheme under Slag Lane viaduct, increasing journey length by 123m (see Volume 2: CT-06-331, F5 to G6);
- closure of Footpath Golborne 38/10 where it crosses the route of the Proposed Scheme. Users will be diverted along Footpath Golborne 40/10 and along Slag Lane, increasing journey length by 423m (see Volume 2: CT-06-331, F4 and F5);
- closure of a section of Footpath Golborne 37/10 where it crosses the route of the Proposed Scheme. The footpath will connect with Footpath Golborne 39/10 diversion and the realigned Slag Lane, increasing journey length by 325m (see Volume 2: CT-06-331, F5 to G6);
- diversion of a section of Footpath Golborne 40/10, up to 55m to the east of its current alignment. The footpath will connect with the realigned Slag Lane, with a negligible change in journey length (see Volume 2: MA05 Map Book, map CT-06-331, G4);
- three ecological mitigation ponds, on the southside of Lowton South embankment and east of Slag Lane realignment, to provide replacement habitat, with surrounding terrestrial habitat (see Volume 2: MA05 Map Book, map CT-06-331, F4 to G5);
- closure of Footpath Golborne 34/10 where it crosses the realigned Slag Lane. Users will be diverted along the realigned Slag Lane increasing journey length by 435m (see Volume 2: MA05 Map Book, map CT-06-328, G6);
- a balancing pond for highway drainage within an area of grassland habitat creation on the south side of the route of the Proposed Scheme and to the east of Slag Lane. Access will be provided from the existing Slag Lane (see Volume 2: MA05 Map Book, map CT-06-331, G4 and G5);
- Slag Lane pumping station and storage tank for highway drainage to the south of the route of the Proposed Scheme. Access will be provided from the realigned Slag Lane (see Volume 2: MA05 Map Book, map CT-06-331, G5);
- realignment of a section of Slag Lane, up to 80m south-east of its existing alignment for 752m, crossing the route of the Proposed Scheme under Slag Lane viaduct, increasing journey length by 59m. Slag Lane realignment will be in cutting with associated landscape mitigation planting to help integrate the cutting into the surrounding landscape. The existing Slag Lane will be closed where it crosses the route of the Proposed Scheme with access retained for residents of properties at Little Byrom Hall Farm on the north side and Lowton Riding Centre on the south side of the route of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-331, G3 to I7);

- Slag Lane viaduct, 44m in length and up to 4m above ground level with a clearance of 6m. The viaduct will have a noise fence barrier along the south-west side 50m in length and 2m in height to provide acoustic screening for properties at Lowton (see Volume 2: MA05 Map Book, map CT-06-331, G5);
- diversion and decommissioning of minor utilities to accommodate Slag Lane overbridge, including Electricity North West, Instalcom and Openreach underground cables and overhead lines and United Utilities water mains (located within the area shown on Volume 2: MA05 Map Book, map CT-06-331);
- Lowton North embankment, 2.8km in length and up to 8m in height, with associated landscape mitigation planting to help integrate the Proposed Scheme into the surrounding landscape and provide visual screening for residents of properties at Lowton and Garton Common and users of Byrom Wood and surrounding footpaths. A noise fence barrier, 210m in length and up to 2m in height on the south-west side will provide acoustic screening for properties in Lowton and Garton Common (see Volume 2: CT-06-331, G5 to map CT-06-333, D4);
- diversion of a section of an underground National Grid 1,050mm high pressure gas pipeline, for 853m in length, to avoid passing under the route of the Proposed Scheme, 180m north-west of the existing Slag Lane (see Volume 2: CT-06-331, G7 to 332, B8);
- Garton Common culvert 250m north-west of Slag Lane, for the realignment of the Tributary of Hey Brook 1 and diversion of Tributary of Hey Brook 2. Tributary of Hey Brook 1 will be realigned for 90m, 15m to the north-west. The Tributary of Hey Brook 2 will be diverted for 180m, 100m to the south-east. Both watercourses will cross under Lowton North embankment via the culvert to drain into Tributary of Hey Brook 1 (see Volume 2: CT-06-331, H4 to H5);
- two balancing ponds for railway drainage located on the north side of Lowton North embankment within an area of landscape mitigation planting. Access will be provided from the existing Slag Lane (see Volume 2: MA05 Map Book, map CT-06-331, H5 to I5);
- an area of landscape mitigation planting on the north side of Lowton North embankment to provide visual screening for residents of properties along the existing Slag Lane, Byrom Hall and Little Byrom Hall Farm, users of Byrom Wood and footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-331, G5 to J4);
- an area of woodland habitat creation on the south side of Lowton North embankment to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-331, I4 to J2);
- realignment of a section of Footpath Golborne 33/10 and access for Little Byrom Hall Farm and Byrom Wood, up to 50m to the north-west of its existing alignment for 330m crossing under the route of the Proposed Scheme through Footpath Golborne 33/10 accommodation underbridge. This will decrease journey length by 9m (see Volume 2: MA05 Map Book, map CT-06-331, J2 to J4);
- Footpath Golborne 33/10 accommodation underbridge, 16m in length, with a height clearance of 5.7m (see Volume 2: MA05 Map Book, map CT-06-331, J4);

- decommissioning of Electricity North West underground cables and overhead lines to accommodate Lowton North embankment (see Volume 2: MA05 Map Book, map CT-06-332, B6);
- three areas of landscape mitigation planting on both sides of Lowton North embankment to provide habitat connectivity and help maintain the integrity of remaining areas of woodland at Byrom Wood, visual screening for users of Byrom Wood and surrounding footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-332, A6 to C6 and A7 to B8);
- two balancing ponds for railway drainage, 290m and 365m north-west of Footpath Golborne 33/10 accommodation underbridge and north of Lowton North embankment. Access will be provided from the existing Slag Lane and Footpath Golborne 33/10 (see Volume 2: MA05 Map Book, map CT-06-332, B7 to C7);
- Footpath Golborne 31/10 underbridge and Critchley culvert, 15m in length, with a height clearance of 4m providing access to Byrom Wood and conveying the realigned Tributary of Hey Brook 4 under the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-332, C6);
- realignment of a section of Footpath Golborne 31/10, up to 19m north-west of its current alignment for 265m, crossing the route of the Proposed Scheme through a pedestrian underbridge, referred to as Footpath Golborne 31/10 underbridge and Critchley culvert, increasing journey length by 102m (see Volume 2: MA05 Map Book, map CT-06-332, C6 to C7);
- diversion of two parallel United Utilities potable water mains, for 818m and 815m in length, under the route of the Proposed Scheme through Footpath Golborne 31/10 underbridge and Critchley culvert (located within the area shown on Volume 2: MA05 Map Book, map CT-06-332);
- closure of an unnamed access track, 70m south-east of Footpath Golborne 31/10 underbridge and Critchley culvert. Users will be diverted along Footpath Golborne 33/10, increasing journey length by 102m (see Volume 2: MA05 Map Book, map CT-06-332, C6 and B7);
- diversion of Tributary of Hey Brook 3 which will be diverted into the surface water drainage for the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-332, B6 to C6);
- realignment of Tributary of Hey Brook 4 for 150m, up to 18m to the north-west of its existing alignment. The watercourse will then cross the route of the Proposed Scheme under Lowton North embankment through Footpath Golborne 31/10 underbridge and Critchley culvert (see Volume 2: MA05 Map Book, map CT-06-332, C6 to C7);
- an area of wetland habitat creation on the north side of Lowton North embankment and west of Byrom Wood to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-332, B8 to D6);
- eight ecological mitigation ponds within an area of grassland habitat creation north of Lowton North embankment, adjacent to the Proposed Scheme and south of Lightshaw

Lane to provide replacement habitat for (see Volume 2: MA05 Map Book, map CT-06-332, C8 to H6);

- an area of wetland habitat creation to the south of the Proposed Scheme, and west of Byrom Wood to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-332, C7 and C6 to E6);
- an area of landscape mitigation planting along the southern side of Lowton North embankment to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-332, C6 to I6);
- an area of woodland habitat creation along the northern side of Lowton North embankment, to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-332, D6 to G7);
- two ecological mitigation ponds within an area of grassland habitat creation to the south of the Proposed Scheme and east of the A573 Wigan Road to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-332, F6 to G3);
- diversion of a section of Footpath Golborne 30/10 where it crosses the route of the Proposed Scheme. The footpath will be diverted 760m north-west for 415m, to connect with Footpath Golborne 27/10 increasing journey length by 1.1km (see Volume 2: MA05 Map Book, map CT-06-332, F6 to H6);
- Lightshaw Lane telecommunications site, 49m by 24m in area, 350m to the south-east of the existing A573 Wigan Road, including a railway telecommunications mast up to 15m in height and associated mitigation planting. Access will be provided from Lightshaw Lane (see Volume 2: MA05 Map Book, map CT-06-332, H6);
- diversion of Electricity North West underground cables and overhead lines to accommodate Lightshaw Lane telecommunications site (located within the area shown on Volume 2: MA05 Map Book, map CT-06-332);
- diversion of a section of Lightshaw Lane up to 250m north-west of its existing alignment for 370m to provide access to Lightshaw Hall Farm from the existing A573 Wigan Road. The existing Lightshaw Lane will be closed where it crosses the route of the Proposed Scheme, increasing journey length by up to 2km (see Volume 2: MA05 Map Book, map CT-06-332, H6 to I6 and I5);
- Footpath Golborne 27/10 underbridge and Windy Bank culvert, 230m north of Windy Bank Farm, for realignment of Windy Bank Brook. The watercourse will be realigned for 100m and will cross under Lowton North embankment to drain back into the Windy Bank Brook (see Volume 2: MA05 Map Book, map CT-06-332, I6);
- diversion of a section of Footpath Golborne 27/10 up to 145m north-west of its existing alignment for 350m, crossing the route of the Proposed Scheme through the underbridge, increasing journey length by 160m (see Volume 2: MA05 Map Book, map CT-06-332, H6 to I5);
- realignment of a section of the A573 Wigan Road, up to 630m west of its existing alignment for 1.9km, crossing the route of the Proposed Scheme under A573 Wigan Road viaducts. The existing A573 Wigan Road will be closed where it crosses the route of the Proposed Scheme with access retained for Aye Bridge Farm, Lightshaw Hall, Balmer's

Farm, Windy Bank Farm and Wigan Road Farm, increasing journey length by up to 186m (see Volume 2: MA05 Map Book, map CT-06-332, G2 to map CT-06-333, E7);

- diversion of a section for the access to Lightshaw Meadows, 145m north-east of its current alignment for 55m. Users will be diverted along the Lightshaw Lane diversion, the existing A573 Wigan Road and the A573 Wigan Road realignment (see Volume 2: MA05 Map Book, map CT-06-332, I6 and H7);
- a balancing pond for highway drainage, 350m to the south-west of Lowton North embankment on the eastern side of the realigned A573 Wigan Road. Access will be provided from the realigned A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-332, I3);
- diversion of a section of an underground United Utilities 305mm potable water main, for 2km in length, to pass under the route of the Proposed Scheme adjacent to Balmer's Farm (see Volume 2: MA05 Map Book, map CT-06-332, I6 and map CT-06-333, D7 and B6);
- diversion and decommissioning of minor utilities to accommodate the realigned A573 Wigan Road and A573 Wigan Road viaducts, including Electricity North West and Openreach underground cables and overhead lines and Cadent Gas mains (located within the area shown on Volume 2: MA05 Map Book, map CT-06-332 to CT-06-333);
- A573 Wigan Road viaducts, two structures carrying the northbound and southbound lines of the route of the Proposed Scheme, 70m in length and up to 8m in height (see Volume 2: MA05 Map Book, map CT-06-333, D3);
- an area of landscape mitigation planting south of the Proposed Scheme between the realigned A573 Wigan Road and the WCML to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-332, I2 to J4 and map CT-06-333, A2 to D3);
- an area of landscape mitigation planting on the northern side of Lowton North embankment to provide visual screening for residents of properties at Abram and Aye Bridge Farm, footpath users and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-332, G6 to map CT-06-333, A5 to E4);
- an area of landscape mitigation planting south of the Proposed Scheme between Balmer's Farm and the realigned A573 Wigan Road to provide visual screening for residents of properties at Balmer's Farm, footpaths users and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-333, A4 to C3);
- an area of woodland habitat creation to the north of the route of the Proposed Scheme between the existing A573 Wigan Road and south of Nan Holes Brook to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-333, A5 to B4);
- an area of wetland habitat creation to the north of the route of the Proposed Scheme between the existing A573 Wigan Road and south of Nan Holes Brook to provide replacement habitat (see Volume 2: MA05 Map Book, map CT-06-333, B4 to B6);
- realignment of Tributary of Nan Holes Brook 1. The watercourse will be realigned for 160m, north-west and will cross under Lowton North embankment through an unnamed

culvert and drain back into its existing alignment (see Volume 2: MA05 Map Book, map CT-06-333, A4);

- a balancing pond for highway drainage, 130m to the south-west of Lowton North embankment on the eastern side of the realigned A573 Wigan Road. Access will be provided from the realigned A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-333, B3);
- a replacement floodplain storage area 170m east of the route of the Proposed Scheme and 130m west of the existing A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-333, B5);
- Nan Holes Brook offline culvert, 290m south-west of Aye Bridge Farm buildings for realignment of a section of Nan Holes Brook. The watercourse will be realigned for 80m on its existing alignment and will cross under the realigned A573 Wigan Road and drain back into Nan Holes Brook (see Volume 2: MA05 Map Book, map CT-06-333, B2 to B3);
- Nan Holes Brook culvert, 170m south of Aye Bridge Farm buildings for the realignment of a section of Nan Holes Brook. The watercourse will be realigned for 80m, 10m south-east of its existing alignment and will cross under Lowton North embankment to drain back into Nan Holes Brook (see Volume 2: MA05 Map Book, map CT-06-333, B4);
- diversion of a section of an underground National Grid 1,050mm high pressure gas pipeline, for 824m in length, to pass under the route of the Proposed Scheme 160m north-west of the existing A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-332, I7 to 333, B1);
- two balancing ponds for railway drainage, 80m to the south-west of the Proposed Scheme on the eastern side of the realigned A573 Wigan Road. Access will be provided from the realigned A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-333, B3 to C3);
- a balancing pond for highway drainage, 110m to the east of the Proposed Scheme on the southern side of the realigned A573 Wigan Road. Access will be provided from A573 Wigan Road realignment (see Volume 2: MA05 Map Book, map CT-06-333, D4 to D5);
- a replacement floodplain storage area 250m east of the route of the Proposed Scheme, and 20m south of the realigned A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-333, D5 and D6);
- diversion of Tributary of Hey Brook 5, up to 110m north of its existing alignment, for 405m. The watercourse will cross under the route of the Proposed Scheme through Hey Brook Tributary culvert and Hey Brook Tributary offline culvert and drain into Hey Brook flood relief channel (see Volume 2: MA05 Map Book, map CT-06-333, E3 to D6);
- Hey Brook flood relief channel, 200m in length and up to 50m west of the existing Hey Brook alignment. The watercourse will cross under Hey Brook offline overbridge and drain into the existing Hey Brook (see Volume 2: MA05 Map Book, map CT-06-333, D6 to C6);
- Hey Brook offline overbridge, 136m in length, up to 7m above existing ground level, to carry the realigned A573 Wigan Road across Hey Brook (see Volume 2: MA05 Map Book, map CT-06-333, D6 to D5);

- realignment of a section of Footpath Ashton-in-Makerfield 24/10 up to 56m east of its current alignment for 120m. The footpath will be realigned under Hey Brook offline overbridge increasing journey length by 23m (see Volume 2: MA05 Map Book, map CT-06-333, D5 to D6);
- an area of landscape mitigation planting along the northern side of the realigned A573 Wigan Road to provide visual screening for users of footpaths and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-333, D5);
- two areas of landscape mitigation planting east of the Proposed Scheme at the junction of the realigned A573 Wigan Road and the existing A573 Wigan Road to provide visual screening for users of the Leeds and Liverpool Canal and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: MA05 Map Book, map CT-06-333, D7 to D6);
- two balancing ponds for railway drainage, 80m to the north-east of the Proposed Scheme on the northern side of the realigned A573 Wigan Road. Access will be provided from the realigned A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-333, D4 and E4);
- Aye Bridge embankment and retaining walls, up to 13m in height above ground level. The retaining walls will be 152m and 125m in length located on the western side of the southbound line and both sides of the northbound line of the route of the Proposed Scheme, between A573 Wigan Road viaducts and WCML box structure (see Volume 2: MA05 Map Book, map CT-06-333, D3 to E3);
- WCML box structure, 142m in length and up to 10m in height to carry the northbound line of the route of the Proposed Scheme over the realigned southbound WCML. The connection of the route of the Proposed Scheme to the WCML is described in the Connection to the WCML section below (see Volume 2: MA05 Map Book, map CT-06-333, E3 to F3);
- Abram embankment and retaining walls, up to 10m in height above ground level. The retaining walls will be 252m and 88m in length located on both sides of the northbound and southbound lines of the route of the Proposed Scheme between the WCML box structure and Abram embankment retaining walls (see Volume 2: MA05 Map Book, map CT-06-333, F3 to H4);
- a balancing pond for railway drainage, 50m to the east of the Proposed Scheme. Access will be provided from the realigned A573 Wigan Road (see Volume 2: MA05 Map Book, map CT-06-333, G4);
- realignment of a section of Footpath Ashton-in-Makerfield 22/30, 1m north of its current alignment for 254m, crossing the route of the Proposed Scheme through Footpath Ashton-in-Makerfield 22/30 accommodation underbridge. A structure will be provided to carry users over Coffin Lane Brook, decreasing journey length by 7m (see Volume 2: MA05 Map Book, map CT-06-333, G3 to G4);
- diversion of a section of Footpath Abram 02/10, up to 206m east of its existing alignment for 1km, crossing the route of the Proposed Scheme through Footpath Ashton-in-

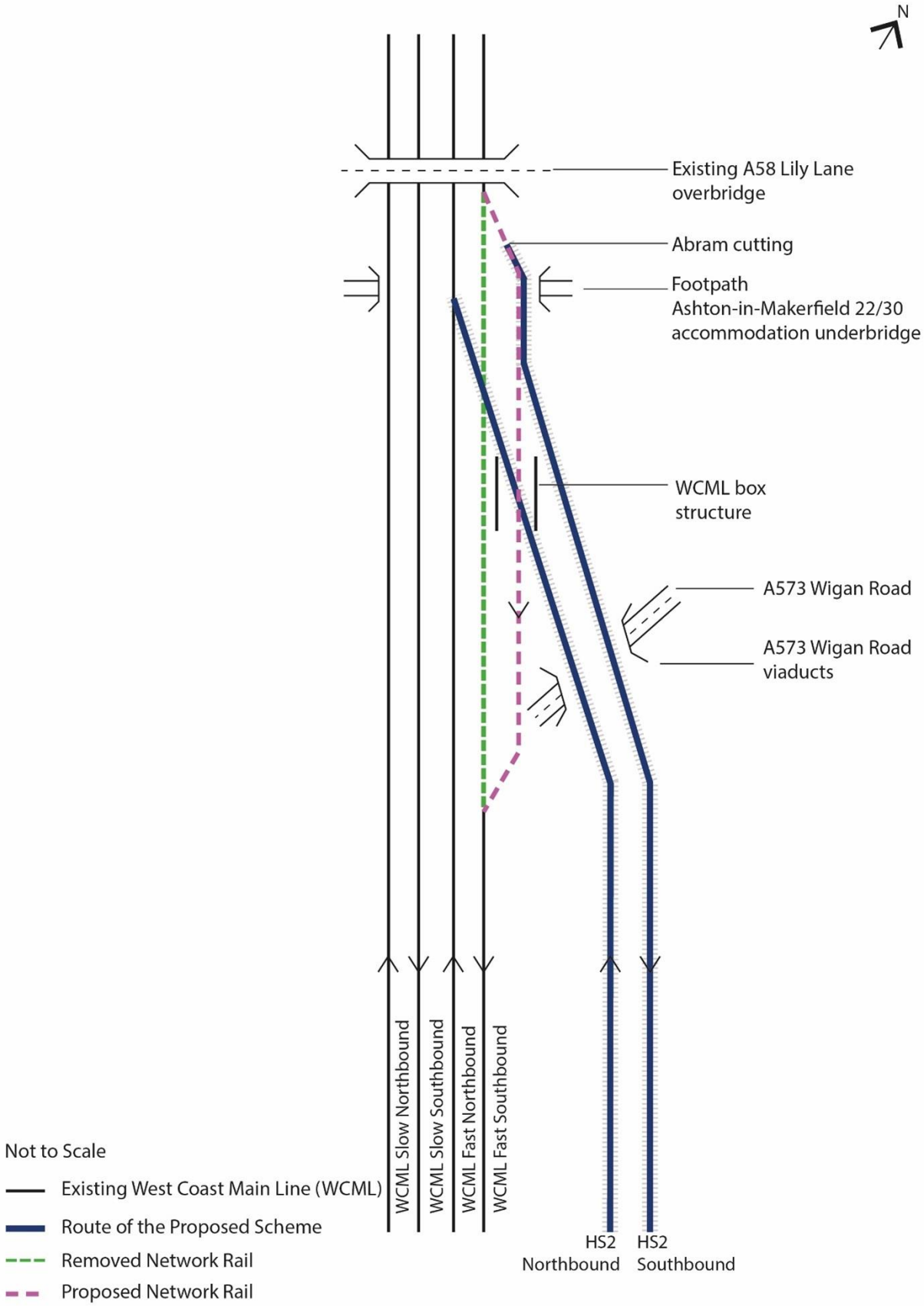
Makerfield 22/30 accommodation underbridge, increasing journey length by 331m (see Volume 2: MA05 Map Book, map CT-06-333, G4 to map CT-06-334, B6);

- Footpath Ashton-in-Makerfield 22/30 accommodation underbridge, 30m in length with a height clearance of 5.5m and providing accommodation access for Locker Lane Farm (see Volume 2: MA05 Map Book, map CT-06-333, G3 to G4);
- a replacement floodplain storage area 20m to the east of the route of the Proposed Scheme, 700m south of the A58 Lily Lane (see Volume 2: MA05 Map Book, map CT-06-333, G4);
- a balancing pond for railway drainage, 50m to the east of the Proposed Scheme. Access will be provided from the A58 Lily Lane via a new access road to the east of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-333, G4);
- Coffin Lane Brook culvert, 820m north of Aye Bridge Farm, for a 60m extension of the existing culvert under the WCML, for the realignment of Coffin Lane Brook. The watercourse will be realigned for 75m, 10m north of its existing alignment and will cross under Abram embankment to drain back into Coffin Lane Brook (see Volume 2: MA05 Map Book, map CT-06-333, G4);
- Abram cutting retaining wall, 247m in length, all of which will be below ground level (see Volume 2: MA05 Map Book, map CT-06-333, H4 to J4);
- Abram cutting 155m in length, up to 1m in depth and 53m in width (see Volume 2: MA05 Map Book, map CT-06-333, H4 to J4);
- a balancing pond for railway drainage, 210m to the east of Abram cutting. Access will be provided from the A58 Lily Lane via an access road to the east of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-06-333, I6);
- Hey Brook culvert, 250m to the south of the A58 Lily Lane, for an extension of the existing culvert under the WCML, for the realignment of Tributary of Coffin Lane Brook 1. The watercourse will be realigned for 50m, on its existing alignment and will cross under Abram cutting and an access road for the Proposed Scheme to reconnect into Tributary of Coffin Lane Brook 1 (see Volume 2: MA05 Map Book, map CT-06-333, I4);
- A58 Lily Lane telecommunications site, 49m by 24m in area, to the east of the route of the Proposed Scheme, 210m to the south of the A58 Lily Lane, including a railway telecommunications mast up to 15m in height and associated landscape mitigation planting. Access will be provided from the A58 Lily Lane via Footpath Abram 02/10 diversion (see Volume 2: CT-06-333, J5); and
- diversion of an Electricity North West 11kV overhead line, 250m south of the A58 Lily Lane for 1.1km alongside the WCML. The power line will be diverted underground to reconnect with existing lines along the A58 Lily Lane (located within the area shown on see Volume 2: MA05 Map Book, map CT-06-333).

Connection to the WCML

2.2.22 Modifications will be required to the WCML south and west of Wigan to enable the connection to the route of the Proposed Scheme. Key features of this connection are shown in Figure 4.

Figure 4: Features of the connection to the West Coast Main Line



2.2.23 A 2.5km section of the WCML, west of Abram from Haydock Branch Junction to Bamfurlong Junction will be modified to enable the connection to the route of the Proposed Scheme. The existing track layout of the WCML consists of four lines: two slow lines (northbound and southbound) and two fast lines (northbound and southbound).

2.2.24 The northbound line of the route of the Proposed Scheme will connect to a realigned section of the WCML northbound fast line via the WCML box structure. The WCML northbound fast line will be realigned within the existing railway corridor (see Volume 2: MA05 Map Book, map CT-06-333, D3 to H4).

2.2.25 The southbound line of the route of the Proposed Scheme will be connected to the WCML southbound fast line. The WCML southbound fast line will be realigned by up to 23m to the east and go through WCML box structure (see Volume 2: MA05 Map Book, map CT-06-332, I3 to map CT-06-333, J4).

2.2.26 The existing overbridge at the A58 Lily Lane will be retained and will not be modified.

Demolitions

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

2.2.28 The following have been identified for demolition: 19 residential properties, 12 commercial/business properties (including farm outbuildings) and one other structure. These will be needed for construction of the permanent features or, in some cases, to enable the construction works for the Proposed Scheme. Demolitions will 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 describes the key construction activities that are envisaged to be needed to build the Proposed Scheme in the Risley to Bamfurlong area. It includes:

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

2.3.2 The construction arrangements described in this section provide the basis for the assessment presented in this ES.

2.3.3 Land used only for construction purposes will be restored as agreed with the owner of the land and the relevant planning authority once construction works on that land are complete.

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

2.3.5 During the construction phase, public roads and PRoW routes will remain open for public use wherever reasonably practicable. Where such routes cross the Proposed Scheme and require diversion, the alternative road or PRoW crossing the Proposed Scheme will be constructed prior to any closure of existing roads or PRoW, wherever reasonably practicable. Where they 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 will be identified by the nominated undertaker and provided where it is safe and reasonably practicable to do so. The routes through these areas may change over the duration of the construction period.

2.3.6 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 described in Section 6 of Volume 1 have been assumed.

Code of Construction Practice

2.3.7 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.

2.3.8 In addition, HS2 Ltd has produced a Community Engagement Framework[8] which sets out how HS2 Ltd and its contractors, as well as their sub-contractors, will undertake community engagement during the construction of the HS2 project. The framework is being implemented on Phase One of HS2 and will apply to all phases of HS2.

[8] High Speed Two Ltd (2017), *Community Engagement Framework*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625971/hs2_community_engagement_framework.pdf.

2.3.9 The objectives of the framework include:

- to set out how HS2 Ltd and its contractors will undertake community engagement during the construction of the project;
- to provide clarity and reassurance to HS2 Ltd's stakeholders about how community engagement activity will 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.

2.3.10 A draft CoCP has been prepared (see Volume 5, Appendix CT-002-00000). It will remain a draft document through the parliamentary process and the CoCP will be finalised at Royal Assent. The CoCP sets out measures to be implemented by the nominated undertaker.

Overview of the construction process

2.3.11 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; site haul routes, site preparation and enabling works; main earthworks and structure works; site restoration; removal of construction compounds where the compound is not required for railway installation works; and associated utility diversions;
- railway installation works including: establishment of construction compounds; infrastructure installation; connections to utilities; changes to the existing rail network; site restoration; and removal of construction compounds;
- site finalisation works; and
- systems testing and commissioning.

2.3.12 General information about the construction process is set out in more detail in Volume 1, Section 6, and the draft CoCP (see Volume 5, Appendix CT-002-00000) 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

2.3.13 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;
- removal of vegetation, and stripping and storing of soil; and
- utility diversions and new utility connections for facilities associated with the Proposed Scheme.

Engineering works

Introduction

2.3.14 Construction of the Proposed Scheme will require the following broad types of engineering works in the Risley to Bamfurlong area, and within land adjacent to the route:

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

2.3.15 The construction of track and railway systems works will include the installation of track form, rails, infill material, minor drainage works, and installation of electrification, signalling and communication equipment.

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

General overview of construction compounds

2.3.17 Main compounds will be used for core project management staff (i.e. engineering, planning and construction delivery) and commercial and administrative staff. These teams will directly

manage some works and coordinate the works at the satellite compounds. In general, a main compound will 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 will be used 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.

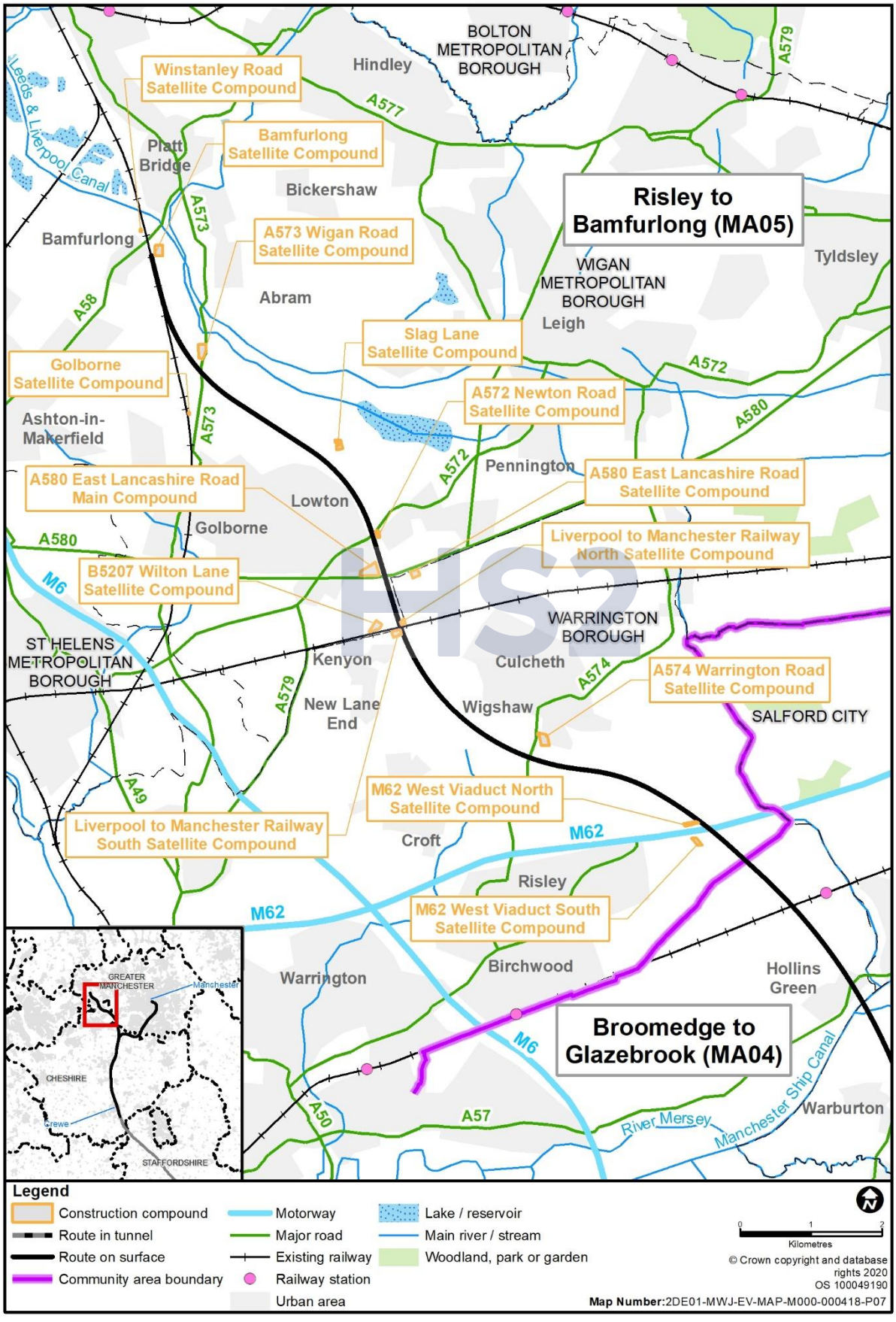
2.3.19 The A580 East Lancashire Road main compound will be located in the Risley to Bamfurlong area. This compound will be used as the base for managing the 11 civil engineering satellite compounds in the area.

2.3.20 Three compounds in the Risley to Bamfurlong area will also be used to install railway systems after the civil engineering works have been completed. A further two compounds will only be used for railway systems works. The railway systems compounds will be managed from Manchester Airport High Speed station main compound, which will be located in the Hulseheath to Manchester Airport area (see Volume 2, Community Area report: Hulseheath to Manchester Airport (MA06)).

2.3.21 The location of construction compounds in the Risley to Bamfurlong area is shown on Figure 5. Map Series CT-05 (in the Volume 2: MA05 Map Book) show in detail the locations of the construction compounds described below.

2.3.22 A number of utility diversions will be required. For the purpose of this assessment, it is assumed that utility diversions in this area will be managed from the compounds listed below.

Figure 5: Location of construction compounds in the Risley to Bamfurlong area



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

2.3.24 Soil stripped as part of the works, prior to it being used when the land is reinstated, will be stored for the duration of construction. The location of topsoil storage areas will generally be adjacent to compounds and areas of construction activity. These areas are referred to as material stockpiles are shown on maps CT-05-326b to CT-05-334, in the Volume 2: MA05 Map Book.

2.3.25 Some areas will include transfer nodes. Transfer nodes are additional areas of land required to unload, store and load bulk earthworks materials that are moved to and from the site on public highways. These areas will allow material to be transferred between road vehicles and site vehicles during construction to balance traffic movements on the road network. The transfer nodes within the Risley to Bamfurlong area are shown on maps CT-05-327 and CT-05-333 in the Volume 2: MA05 Map Book.

2.3.26 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

2.3.27 Construction vehicles, where loaded, will carry materials, plant, other equipment and the workforce. Vehicle movements will take place on public roads, within construction compounds and transfer nodes and between the compounds or transfer nodes and working areas. Where reasonably practicable, movements between the construction compounds or transfer nodes and the working areas will 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.

2.3.28 The construction compounds, transfer nodes and railheads will provide the interface between the construction works and the public road or railway network. The likely road routes to access compounds in the Risley to Bamfurlong area are described in subsequent sections of this report.

Use of borrow pits

2.3.29 The Proposed Scheme will require material with suitable engineering properties for the construction of a high speed railway. This is described as acceptable engineering material and will be provided, in part, through excavation of cuttings and other earthworks undertaken to construct the Proposed Scheme. A borrow pit is an area where additional acceptable engineering material will be extracted for use in the construction of the Proposed Scheme.

2.3.30 Volume 5: Appendix CT-008-00000 Borrow Pit report sets out the need for and approach to identifying suitable borrow pit locations, as well as the use and restoration strategy for the proposed borrow pits. General information on borrow pits is also provided in Volume 1, Section 6.

2.3.31 The borrow pits required for construction of the Proposed Scheme are all located in the Wimboldsley to Lostock Gralam area (MA02). Material from these borrow pits may be used in the construction of earthworks in other areas. Material excavated from tunnels, cuttings and other earthworks as part of the construction of the Proposed Scheme may be used to backfill or restore the borrow pits. This material will, where reasonably practicable, be transported via site haul routes. However, some of the material may be provided from more distant locations across the Proposed Scheme. As such it may be necessary to transport some of this material along public roads.

Construction compounds

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

Figure 6: Construction compounds for civil engineering works

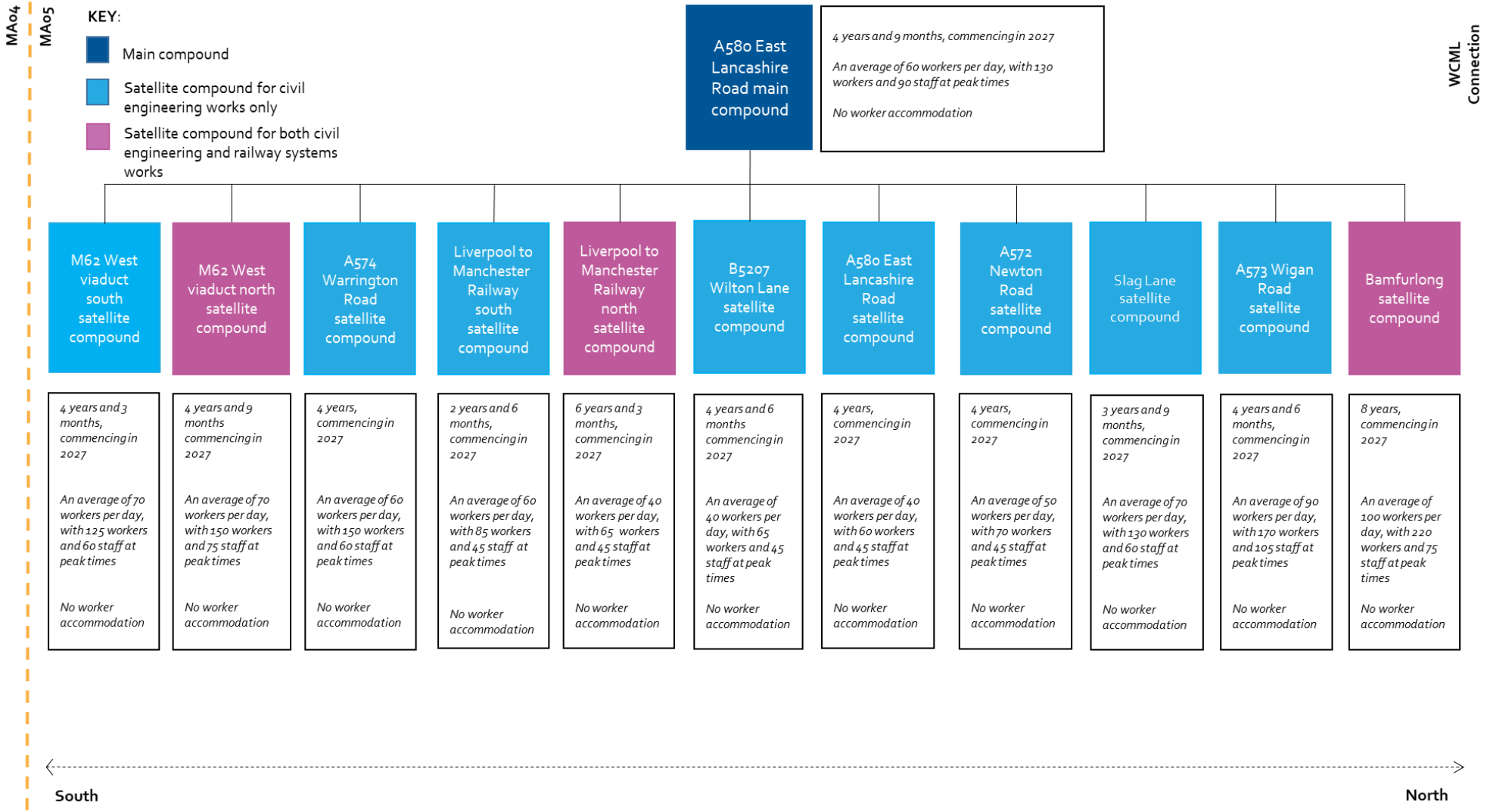
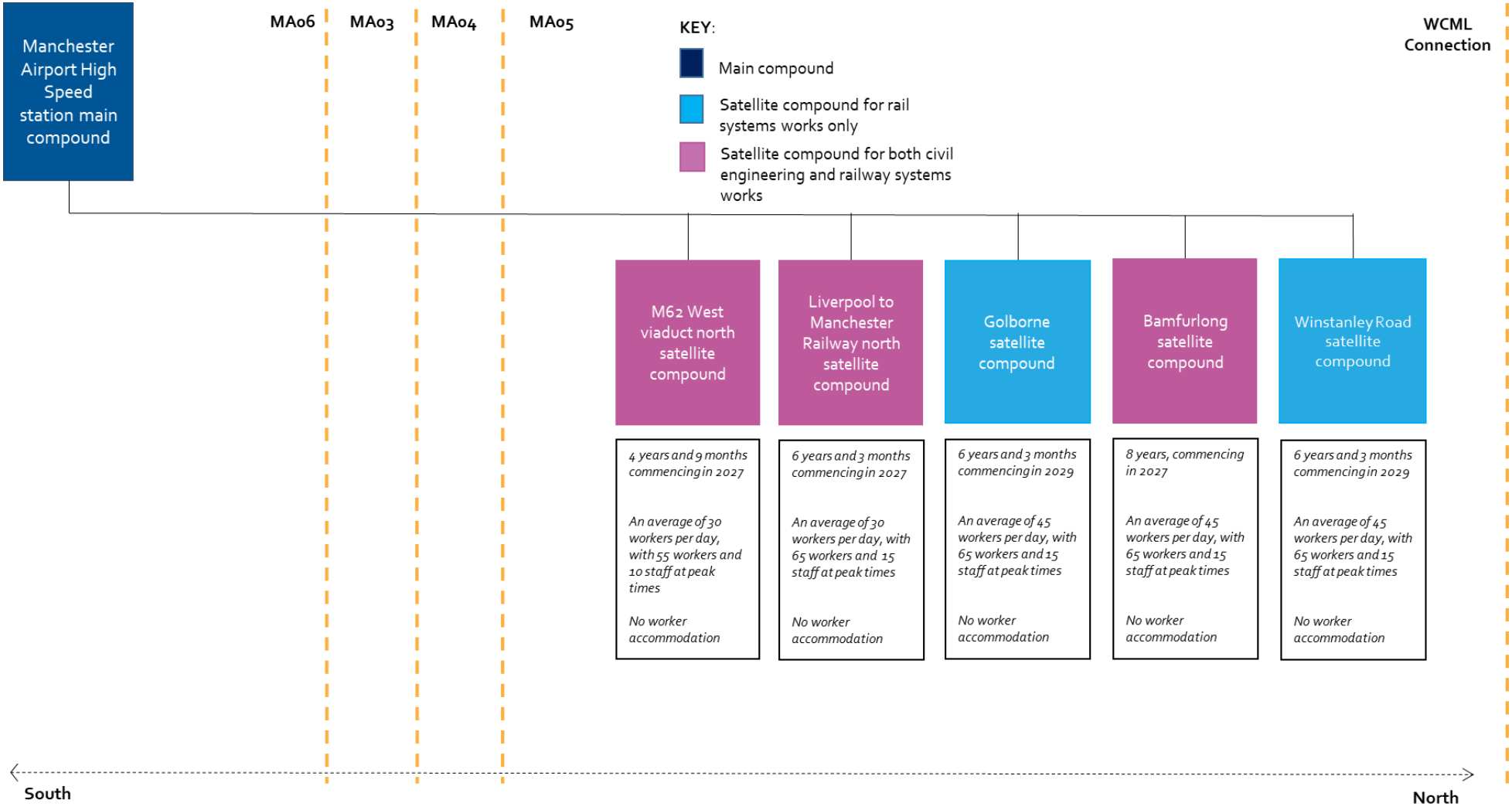


Figure 7: Construction compounds for railway systems works



M62 West viaduct south satellite compound

2.3.33 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-327, A7 to C5). It will:

- provide one transfer node; and
- be accessed from junction 11 of the M62 and via Silver Lane (see Volume 2: MA05 Map Book, map CT-05-327, F1 to C5).

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

2.3.35 This compound will be used to manage the construction of M62 West viaduct on the south side of the M62, which will take four years and three months to complete.

2.3.36 This compound will also be used to manage the highway improvement works to the A574 Birchwood Way and Daten Avenue.

M62 West viaduct north satellite compound

2.3.37 This compound will be used to manage civil engineering works and railway systems works (see Volume 2: MA05 Map Book, map CT-05-327, D6 to F7). It will:

- be used to manage civil engineering works for a period of three years and six months, followed by both civil engineering and railway system works for a period of six months, and then be followed by railway systems works for a period of nine months;
- provide 19 temporary material stockpiles on both sides of the route of the Proposed Scheme (see Volume 2: MA05 Map Book: map CT-05-327, C7 to map CT-05-330, C5);
- provide a transfer node; and
- be accessed via junction 11 of the M62 (see Volume 2: MA05 Map Book, map CT-05-327, G2 to D6).

2.3.38 The works to be managed from this compound will require demolition of the buildings and structures identified in Table 1.

Table 1: Demolitions required as a result of the works to be managed from M62 West viaduct north satellite compound

Type	Description	Location	Feature resulting in the demolition
Residential	One residential property and outbuildings	Glaziers Lane Farm, Culcheth	Culcheth cutting
Residential	One residential property and outbuildings	Wigshaw Lane, Culcheth	Culcheth cutting
Residential	One residential property and outbuildings	Phillips Farm, part of Partridge Lakes Fishery, Glaziers Lane, Culcheth	Culcheth cutting
Residential	One residential property and outbuildings	Swallow Barn, Glaziers Lane, Croft	Culcheth cutting

Type	Description	Location	Feature resulting in the demolition
Commercial	One commercial building, The Bungalow, Taylor Estates	Taylor Business Park, Taylor Industrial Estate Culcheth	Culcheth cutting
Commercial	One commercial building, The Warehouse Studios comprising 11 businesses	The Warehouse Studios, Glaziers Lane, Croft	Culcheth cutting
Commercial	Commercial buildings associated with Glaziers Lane Farm	Glaziers Lane Farm, Culcheth	Culcheth cutting

2.3.39 The compound will be used to manage the construction of the following bridges and viaducts:

- M62 West viaduct on the north side of the M62, which will take two years and nine months to complete;
- Risley East accommodation underbridge, which will take one year and three months to complete; and
- Footpath Croft 13 accommodation underbridge, which will take one year and nine months to complete.

2.3.40 The compound will also be used to manage the construction of the following earthworks:

- Culcheth South embankment, which will take three years and nine months to complete;
- Culcheth cutting, which will take two years and three months to complete; and
- Culcheth North embankment, which will take two years and three months to complete.

2.3.41 The works to be managed from this compound will require the following works to public and private roads:

- temporary lane closures and associated traffic management for the permanent realignment of the M62 (between junctions 10 and 11) for a period of two years; and
- up to six temporary weekend and off peak or overnight closures of all lanes of the M62, between junctions 11 and 12. Works will be undertaken over a period of two months during the installation of M62 West viaduct. Users will be diverted via M6, the M56, the A5103 Princess Parkway and the M60, increasing journey length by up to 28.5km.

2.3.42 The works to be managed from this compound will require the following works to PRoW:

- local measures will be used for a period of one year and six months during construction to keep Footpath Croft 13 open, where reasonably practicable. On completion of construction the access to Ratcliffe Hall Farm and Footpath Croft 13 will be permanently realigned via Footpath Croft 13 accommodation underbridge; and
- during construction Footpath Croft 28 will be permanently diverted to Footpath Croft 13.

2.3.43 The works to be managed from this compound will require the following drainage works and watercourse diversions:

- permanent realignment of a section of Tributary of Holcroft Lane Brook 2 (known locally as Silver Lane Brook) and diversion Tributary of Holcroft Lane Brook 3, which will take one year and nine months to complete;
- permanent diversion of a section of Tributary of Holcroft Lane Brook 4, which will take six months to complete;
- Holcroft Lane Brook offline culvert, which will take six months to complete; and
- Holcroft Lane Brook culvert, which will take six months to complete.

2.3.44 The works to be managed from this compound will require utility works including, the permanent diversion of an underground National Grid 1,050mm high pressure gas pipeline, which will take nine months to complete.

2.3.45 The compound will be used to manage the construction and installation of the M62 auto-transformer station. The civils works for the construction of the M62 auto-transformer station foundations and building will take nine months, followed by both civils and railway systems works for three months. The railway systems installation works for the M62 auto-transformer station will take a further one year to complete.

A574 Warrington Road satellite compound

2.3.46 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-328, G7 to H9). It will:

- provide a temporary material stockpile to the north of the route of the Proposed Scheme (see Volume 2: MA05 Map Book: map CT-05-328, D7); and
- be accessed from the A574 Warrington Road and junction 11 of the M62.

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

2.3.48 The compound will be used to manage the construction of the following bridges:

- A574 Warrington Road overbridge, which will take three years to complete; and
- Wigshaw Lane overbridge, which will take two years to complete.

2.3.49 The works to be managed from this compound will require the following works to public and private roads:

- temporary diversion of a section of New Hall Lane for a period of two years, increasing journey length by 432m. Upon completion of construction New Hall Lane will be permanently diverted and a section closed where it crosses the route of the Proposed Scheme;
- permanent realignment of a section of A574 Warrington Road, which will take three years to complete. The A574 Warrington Road will remain open while the realignment is constructed offline (i.e. generally constructed along or nearby existing routes, which will

remain open during construction). On completion of construction, traffic management measures will be implemented to enable connection between the realigned section of road and the existing road;

- permanent realignment of a section of Glaziers Lane, which will take one year and three months to complete. During construction access to the Partridge Lakes Fishery will be maintained via the existing A574 Warrington Road and the existing Wigshaw Lane. On completion of construction the existing Glaziers Lane will be closed where it crosses the route of the Proposed Scheme with access retained to the Partridge Lakes Fishery;
- construction of the proposed new Culcheth Link Road, which will take one year and three months to complete; and
- Wigshaw Lane realignment, including Wigshaw Lane retaining wall, which will take two years to complete. During construction, the existing Glaziers Lane and Wigshaw Lane will remain open with traffic management measures implemented during some of the construction stages. On completion of construction users will be permanently diverted via the Culcheth Link Road and the Wigshaw Lane realignment.

2.3.50 Access to the Taylor Business Park and Newchurch Old Refectory (also known as Newchurch Old Rectory) will be maintained during construction.

2.3.51 The works to be managed from this compound will require the following works to PRoW:

- temporary closure of Footpath Croft 15 (also known as New Hall Lane Path) for a period of three years. During construction users will be diverted via Footpath Croft 17 and the existing A574 Warrington Road, increasing journey length by 467m. On completion of construction the footpath will be permanently diverted via the realigned A574 Warrington Road;
- temporary diversion of Footpath Croft 17 over a period of four years, increasing journey length by 77m. During construction users will be diverted for 220m around the perimeter of the construction site and 50m to the north around the perimeter of the A574 Warrington Road satellite compound to link with the existing A574 Warrington Road. Local measures will be used during construction to keep Footpath Croft 17 open across the construction access, where reasonably practicable. On completion of construction a section of Footpath Croft 17 will be reinstated on its existing alignment and a section will be realigned around the balancing pond to connect to the realigned A574 Warrington Road;
- local measures will be used for a period of six months during construction to keep Footpath Croft 19 open, where reasonably practicable. On completion of construction Footpath Croft 19 will be closed and users will be permanently diverted along a section of A574 Warrington Road realignment and New Hall Lane; and
- temporary diversion of Footpath Croft 8 via the existing Wigshaw Lane for a period of one year and nine months, increasing journey length by 107m. On completion of construction, Footpath Croft 8 will be permanently closed where it crosses the route of the Proposed Scheme with users diverted via Wigshaw Lane realignment.

2.3.52 The works to be managed from this compound will require the following works to watercourses:

- permanent realignment of the Tributary of Holcroft Lane Brook 4, which will take six months to complete; and
- permanent diversion of Tributary of Cross Brook 1, which will be diverted into the surface water drainage of the Proposed Scheme.

2.3.53 The works to be managed from this compound will require the following works to utilities:

- permanent diversion of a minor Electricity North West 33kV overhead powerline to underground and reconnect to existing lines which will take one year and nine months to complete; and
- decommissioning of a minor United Utilities water main which will take six months to complete.

2.3.54 In addition, the following utility works will be carried out during the construction period, the permanent diversion or decommissioning of a number of minor utilities, including Openreach and Electricity North West underground cables and overhead lines and United Utilities water and sewer mains and a Cadent Gas pipeline.

2.3.55 The compound will also be used to manage the construction and installation of the Glaziers Lane telecommunications site, which will take six months to complete.

Liverpool to Manchester Railway south satellite compound

2.3.56 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-330, C3 and C4). It will:

- provide a temporary material stockpile to the west of the route of the Proposed Scheme and immediately south of the Liverpool to Manchester Railway south satellite compound (see Volume 2: MA05 Map Book, map CT-05-330, B4 to C5); and
- be accessed from the B5207 Kenyon Lane.

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

2.3.58 The compound, along with Liverpool to Manchester Railway north satellite compound, will be used to manage the construction of the following bridges and viaducts:

- Culcheth North (Railway) viaduct, which will take two years and three months to complete; and
- Footpath Croft 8a and 108 overbridge, which will take two years to complete.

2.3.59 The works to be managed from this compound will require the following works to PRoW:

- local measures will be used for a period of two years during construction to keep the footpath open, where reasonably practicable. On completion of construction Footpath Croft 8a will be permanently realigned over Footpath Croft 8a and 108 overbridge; and
- local measures will be used for a period of two years during construction to keep Footpath Croft 108 and Culcheth and Glazebury 108 open, where reasonably practicable. On completion of construction Footpath Croft 108 and Culcheth and Glazebury 108 will be permanently diverted over Footpath Croft 8a and 108 overbridge.

2.3.60 The works to be managed from this compound will include the construction of Kenyon culvert, which will take nine months to complete.

Liverpool to Manchester Railway north satellite compound

2.3.61 This compound will be used to manage civil engineering works and railway systems (see Volume 2: MA05 Map Book, map CT-05-330, C5 to D5). It will:

- be used to manage civil engineering works for a period of two years and three months, followed by railway system works for a period of one year and then a further period of railway systems works for six months; and
- be accessed from the existing B5207 Wilton Lane, the A572 Newton Road and the A580 East Lancashire Road.

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

2.3.63 The compound will manage the construction of Culcheth North (Railway) viaduct, which will take two years and three months to complete.

2.3.64 The compound will be used to manage the installation of B5207 Wilton Lane auto-transformer station railway systems equipment, which will take one year to complete.

2.3.65 Key railway systems installation works to be managed from this compound include the installation of crossover connections, track and associated equipment located north of B5207 Wilton Lane overbridge, which will take six months to complete.

2.3.66 In addition, the following utility works will be carried out during the construction period, including, the diversion and decommissioning of a number of minor utilities including Electricity North West underground cables and overhead lines and United Utilities water mains.

B5207 Wilton Lane satellite compound

2.3.67 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-330, D1 to D3). It will be accessed from the existing B5207 Wilton Lane, the A572 Newton Road and then the A580 East Lancashire Road.

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

2.3.69 The compound will be used to manage the construction of B5207 Wilton Lane overbridge, which will take two years and nine months to complete.

2.3.70 The compound will also be used to manage the construction of the permanent realignment of the B5207 Wilton Lane, which will take two years and nine months to complete. During construction the existing B5207 Wilton Lane will remain open with temporary traffic management measures.

2.3.71 The compound will be used to manage the construction of B5207 Wilton Lane auto-transformer station foundations and buildings and will take one year to complete.

A580 East Lancashire Road satellite compound

2.3.72 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-330, F9 to G8). It will:

- provide three material stockpiles to the south of the A580 East Lancashire Road to the east and west of the route of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-05-330, E4 to F5, G3 to H1, and F6 to G8); and
- be accessed from the A580 East Lancashire Road.

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

2.3.74 The compound, along with A580 East Lancashire Road main compound, will be used to manage the construction of A580 East Lancashire Road overbridge, including associated highway works and East Lancashire Road offline culvert which will take two years and nine months to complete.

2.3.75 The works to be managed from this compound, along with A580 East Lancashire Road main compound, will require the temporary realignment of a 1km section of the A580 East Lancashire Road, 80m to the south of the existing alignment, for a period of two years and six months during construction, increasing journey length by 26m. Following the construction, the A580 East Lancashire Road will be permanently reinstated on its existing alignment.

2.3.76 The works to be managed from this compound will require the following works to PRoW:

- temporary diversion of Footpath Golborne 80/10 for a period of three years and nine months. During construction users will be diverted for 507m, 500m west around the perimeter of the land required for construction of the A580 East Lancashire Road realignment and a temporary material stockpile to cross the A580 East Lancashire Road and link with Footpath Golborne 77/10. On completion of construction Footpath Golborne 80/10 will be permanently reinstated on its existing alignment;
- temporary diversion of Footpath Golborne 79/10 for a period of three years and nine months. During construction users will be diverted for 225m, 130m west around the perimeter of a temporary material stockpile to cross the A580 East Lancashire Road and

link with Footpath Golborne 77/10, increasing the journey length by 225m. On completion of construction Footpath Golborne 79/10 will be permanently reinstated on its existing alignment; and

- temporary diversion of Footpath Golborne 72/10 and Footpath Culcheth and Glazebury 72 for a period of three years and nine months. During construction users will be diverted for 583m, 300m east around the perimeter of a temporary material stockpile and A580 East Lancashire Road satellite compound to link with Footpath Golborne 70/10 on the northern side of the A580 East Lancashire Road. On completion of construction Footpath Golborne 72/10 will be permanently reinstated on its existing alignment.

2.3.77 The works to be managed from this compound will require utility works including, the permanent diversion of an underground United Utilities 1,200mm water trunk main which will take nine months to complete.

A580 East Lancashire Road main compound

2.3.78 This compound (shown on Volume 2: MA05 Map Book, map CT-05-330, G4 and H4 to H2) will be used to manage civil engineering works. It will:

- provide main compound support to 11 civil engineering satellite compounds in the Risley to Bamfurlong area, as illustrated in Figure 6;
- provide 16 material stockpiles on both sides of the route of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-05-330, H3 and H4 to map CT-05-332, I6); and
- be accessed from the A580 East Lancashire Road.

2.3.79 The works to be managed from this compound will 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 A580 East Lancashire Road main compound

Type	Description	Location	Feature resulting in the demolition
Residential	One residential property	Willowpool, Wilton Lane, Culcheth	Lowton cutting
Residential	One residential property and outbuildings	White's Farm, Wilton Lane, Culcheth	Lowton cutting
Residential	One residential property and outbuildings	Birchalls Farm, Wilton Lane, Culcheth	Lowton cutting
Residential	Eight properties on A572 Newton Road	Newton Road	Lowton cutting
Residential	Two residential properties and outbuildings	Lightshaw Lane, Golborne	Lowton North embankment
Commercial	Commercial buildings associated with White's Farm	White's Farm, Wilton Lane, Culcheth	Lowton cutting
Commercial	Commercial buildings associated with Birchalls Farm	Birchalls Farm, Wilton Lane, Culcheth	Lowton cutting

Type	Description	Location	Feature resulting in the demolition
Commercial	One commercial property at Momentum House comprising three businesses	Momentum House, Enterprise Way, Lowton	Lowton cutting
Commercial	One commercial property	Enterprise Way, Lowton	Lowton cutting
Commercial	Commercial premises at Lowton Business Park (Automation House) comprising 19 businesses	Lowton Business Park, Automation House, Newton Road, Lowton	Lowton cutting
Commercial	Two commercial premises at Pocket Nook Enterprise Park	Pocket Nook Lane, Lowton	Lowton cutting
Other	Telecommunication mast	AT Group Ltd, Telecommunication Mast, Automation House, Newton Road, Lowton	Lowton cutting

2.3.80 The compound, along with A580 East Lancashire Road satellite compound, will be used to manage the construction of the north side of A580 East Lancashire Road overbridge, including associated highway works and East Lancashire Road offline culvert which will take two years and nine months to complete.

2.3.81 The compound will also be used to manage the construction of the following earthworks:

- Lowton cutting, which will take three years and three months to complete;
- Lowton South embankment, which will take two years and nine months to complete; and
- Lowton North embankment, which will take three years to complete.

2.3.82 A pre-cast yard and pre-cast laydown area will be located at this compound for a period of four years and nine months. It will be used to manufacture and store concrete elements, such as bridge beams, and will facilitate the construction of A580 East Lancashire Road overbridge. It will be accessed from the A572 Newton Road.

2.3.83 The works to be managed from this compound, along with A580 East Lancashire Road satellite compound, will include the temporary realignment of a 1km section of the A580 East Lancashire Road, 80m to the south of the existing alignment, for a period of two years and six months during construction, increasing journey length by 26m. Following the construction period, the A580 East Lancashire Road will be permanently reinstated on its existing alignment.

2.3.84 The works to be managed from this compound will require the following works to PRoW:

- temporary closure of Footpath Golborne 78/10 for a period of four years and nine months. During construction users will be diverted along Footpath Golborne 77/10, 230m to the west, increasing journey length by 507m. On completion of construction Footpath Golborne 78/10 will be permanently reinstated on its existing alignment;
- temporary diversion of Footpath Golborne 77/10 for a period of four years and nine months. During construction users will be diverted for 185m around the perimeter of the land required for construction of the Proposed Scheme, 140m to the west to link with the

diverted Footpath Golborne 79/10 and Footpath Golborne 80/10, increasing the journey length by 225m. On completion of construction Footpath Golborne 77/10 will be permanently reinstated on its existing alignment; and

- temporary diversion of Footpath Golborne 70/10, for a period of three years and nine months. During construction users will be diverted for 750m around the perimeter of the temporary construction boundary of the A580 East Lancashire Road realignment 300m east to link with the realigned Footpath Golborne 72/10, increasing the length of the journey by 583m. On completion of construction Footpath Golborne 70/10 will be permanently reinstated on its existing alignment.

2.3.85 The works to be managed from this compound will also require the following watercourse diversions and drainage works:

- permanent realignment of a section of Carr Brook, which will take three months to complete;
- permanent diversion of Tributary of Hey Brook 2, which will take three years to complete;
- Newton Road access offline culvert, which will take six months to complete;
- Golborne pumping station access culvert, which will take nine months to complete; and
- Carr Brook aqueduct, which will take two years and three months to complete.

2.3.86 The works to be managed from this compound will require the following works to utilities:

- permanent diversion of an underground United Utilities 457mm potable water main, which will take three months to complete; and
- permanent diversion of an underground United Utilities 305mm potable water main, which will take six months to complete.

2.3.87 In addition, the following utility works will be carried out during the construction period, the diversion and decommissioning of a number of minor utilities including Openreach, Virgin Media underground cables, Electricity North West underground cables and overhead lines and a Cadent gas main.

A572 Newton Road satellite compound

2.3.88 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-331, A4 to A5). It will be accessed from the A572 Newton Road.

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

2.3.90 The compound will be used to manage the construction of the A572 Newton Road overbridge and associated highways works, which will take one year and three months, later followed by a period of two years and three months to complete.

2.3.91 The works to be managed from this compound will require the temporary realignment of a 400m section of the A572 Newton Road, 20m to the south-east of the existing alignment, for a period of two years during construction, increasing the length of journey by 17m. On

completion of construction, the road will be permanently reinstated along its existing alignment.

2.3.92 The compound will be used to manage the construction of Newton Road accommodation access, which will take nine months to complete.

2.3.93 In addition, the following utility works will be carried out during the construction period, the diversion and decommissioning of a number of minor utilities including Openreach, Virgin Media underground cables, Electricity North West underground cables and overhead lines, United Utilities water mains and sewer and Cadent gas main.

Slag Lane satellite compound

2.3.94 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-331, H7 to H8). It will be accessed from Slag Lane and from Byrom Lane/Sandy Lane.

2.3.95 The works to be managed from this compound will 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 Slag Lane satellite compound

Type	Description	Location	Feature resulting in the demolition
Residential	Two residential properties and outbuildings	Slag Lane, Lowton	Slag Lane viaduct and Slag Lane realignment
Commercial	Two commercial properties and outbuildings associated with the above residential properties	Slag Lane, Lowton	Slag Lane viaduct and Slag Lane realignment

2.3.96 The compound will be used to manage the construction of the following bridges and viaducts:

- Slag Lane viaduct, which will take one year and six months to complete;
- Footpath Golborne 63/10 underbridge and Small Brook culvert, which will take one year to complete; and
- Footpath Golborne 33/10 accommodation underbridge, which will take two years to complete.

2.3.97 Slag Lane will be permanently realigned, which will take three years to complete and will be constructed offline. During construction the existing road will remain open and temporary traffic management measures will be implemented. On completion of construction of the Slag Lane realignment, temporary road restrictions and traffic management measures will be implemented for two months to enable connection between the realigned section and the existing road.

2.3.98 The compound will be used to manage the construction of the private access road to Lowton Riding Centre and Byrom Hall, which will take six months to complete. During construction access to the properties will be maintained.

2.3.99 The works to be managed from this compound will require the following works to PRoW:

- local measures will be used for a period of two years and three months during construction to keep the temporary diversion of Footpath Golborne 63/10 open, where reasonably practicable. On completion of construction, Footpath Golborne 63/10 will be permanently realigned through Footpath Golborne 63/10 underbridge and Small Brook culvert;
- temporary diversion of Footpath Golborne 39/10 for a period of two years and five months. During construction users will be diverted along Footpath Golborne 37/10 and the existing Slag Lane, increasing journey length by 605m. On completion of construction, Footpath Golborne 39/10 will be permanently diverted under Slag Lane viaduct;
- permanent diversion of Footpath Golborne 40/10, which will take nine months to complete. Upon completion of construction the footpath will connect with the realigned Slag Lane; and
- local measures will be used for a period of two years during construction to keep the temporary realignment of Footpath Golborne 33/10 open, where reasonably practicable. During construction users will be realigned up to 100m south of its existing alignment, increasing journey length by 56m. On completion of construction, Footpath Golborne 33/10 will be permanently realigned via Footpath Golborne 33/10 accommodation underbridge.

2.3.100 The works to be managed from this compound will also require the following watercourse diversions and drainage works:

- permanent realignment of Small Brook, which will take three months to complete;
- permanent realignment of Tributary of Hey Brook 1, which will take three months to complete; and
- Garton Common culvert, which will take six months to complete.

2.3.101 The compound will be used to manage construction and installation of the Slag Lane telecommunications site, which will take six months to complete.

2.3.102 The works to be managed from this compound will require the following works to utilities:

- permanent diversion of a section of an underground National Grid 1,050mm high pressure gas pipeline, which will take nine months to complete; and
- permanent diversion of two United Utilities water mains, which will take six months to complete.

2.3.103 In addition, the following utility works will be carried out during the construction period, the diversion and decommissioning of a number of minor utilities including Openreach underground cables, Electricity North West underground cables and overhead lines and United Utilities water main.

Golborne satellite compound

2.3.104 This compound will be used to manage railway systems works (see Volume 2: MA05 Map Book, map CT-05-332, H2). It will be accessed from the A573 Wigan Road.

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

2.3.106 The compound will be used to manage the construction and installation of works to connect the Proposed Scheme to the WCML. The installation of the connection works will take place intermittently for a period of six years and three months to complete.

A573 Wigan Road satellite compound

2.3.107 This compound will be used to manage civil engineering works (see Volume 2: MA05 Map Book, map CT-05-333, A5 to B6). It will:

- provide seven material stockpiles on both sides of the route of the Proposed Scheme (see Volume 2: MA05 Map Book, map CT-05-332, J6 to map CT-05-333 I4);
- provide one transfer node, accessed from the A573 Wigan Road and the A580 East Lancashire Road; and
- be accessed from the A573 Wigan Road.

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

2.3.109 The compound will be used to manage the construction of the following structures:

- A573 Wigan Road viaducts, which will take two years and three months to complete;
- WCML box structure, along with Bamfurlong satellite compound, which will take four years and six months to complete;
- Hey Brook offline overbridge, which will take one year and nine months to complete;
- Footpath Golborne 27/10 underbridge and Windy Bank culvert, which will take six months to complete; and
- Footpath Golborne 31/10 underbridge and Critchley culvert, which will take one year and six months to complete.

2.3.110 The compound will be used to manage the construction of Aye Bridge embankment and retaining walls, which will take two years and nine months to complete;

2.3.111 The compound, along with Bamfurlong satellite compound, will also be used to manage the construction of the following earthworks:

- Abram embankment retaining walls, which will take three years and six months to complete;
- Abram cutting, which will take two years to complete; and
- Abram cutting retaining walls, which will take three years and nine months to complete.

2.3.112 The works to be managed from this compound and Bamfurlong satellite compound will also require the permanent realignment of the A573 Wigan Road, which will take three years and three months to complete. During construction, the existing road will remain open and temporary traffic management measures will be implemented. On completion of construction, traffic management measures will be implemented for three months to enable connection between the realigned section of road and the existing road.

2.3.113 The works to be managed from this compound will also require the following works to public and private roads:

- permanent closure of an unnamed access;
- permanent diversion of Lightshaw Lane, which will take one year, and six months, later followed by a period of six months to complete. During construction of the diversion, the existing route will remain open and temporary traffic management measures will be implemented;
- permanent diversion of Lightshaw Meadows access, which will take one year to complete, with access maintained during construction; and
- replacement of private access to Balmer's Farm which will take three months to complete, with access maintained during construction.

2.3.114 The works to be managed from this compound will require the following works to PRoW:

- local measures will be used for a period of two years and three months to keep the temporary realignment of Footpath Golborne 31/10 open, where reasonably practicable. The footpath will be realigned 200m south-east of its existing alignment increasing journey length by 151m. On completion of construction Footpath Golborne 31/10 will be permanently realigned through Footpath Golborne 31/10 underbridge and Critchley culvert);
- temporary diversion of Footpath Golborne 30/10 for a period of three years and nine months. During construction users will be diverted 420m along Footpath Golborne 27/10 and the diverted Lightshaw Lane, increasing journey length by 671m. On completion of construction Footpath Golborne 30/10 will be diverted through Footpath Golborne 27/10 underbridge and Windy Bank culvert and along the diverted Lightshaw Lane; and
- local measures will be used for a period of three years and nine months during construction to keep Footpath Golborne 27/10 open, where reasonably practicable. On completion of construction Footpath Golborne 27/10 will be diverted through Footpath Golborne 27/10 underbridge and Windy Bank culvert and along the diverted Lightshaw Lane.

2.3.115 The works to be managed from this compound will also require the following works to watercourses, diversions and drainage:

- permanent diversion of Tributary of Hey Brook 3 and realignment of Tributary of Hey Brook 4, which will take three months to complete;
- permanent realignment of Windy Bank Brook, which will take three months to complete;

- permanent realignment of Nan Holes Brook, which will take six months to complete;
- Hey Brook flood relief channel, which will take six months to complete;
- Nan Holes Brook offline culvert, which will take six months to complete;
- Nan Holes Brook culvert, which will take six months to complete;
- Coffin Lane Brook culvert, which will take six months to complete; and
- Hey Brook Tributary offline culvert, which will take six months to complete.

2.3.116 The works to be managed from this compound will require utility works including the permanent diversion of an underground National Grid 1,050mm high pressure gas pipeline, which will take nine months to complete.

2.3.117 In addition, the following utility works will be carried out during the construction period: the diversion and decommissioning of a number of minor utilities, including Openreach underground cables, Electricity North West underground cables and overhead lines and a Cadent gas main.

2.3.118 The compound will also manage construction and installation of the Lightshaw Lane telecommunications site, which will take six months to complete.

Bamfurlong satellite compound

2.3.119 This compound will be used to manage civil engineering and railway systems works (see Volume 2: MA05 Map Book, map CT-05-333, I5 to J6). It will:

- be used to manage civil engineering works for a period of one year and nine months, followed by both civil engineering and railway systems works for a period of three years, and then followed by railway systems works only for three years and six months; and
- be accessed from the A58 Lily Lane.

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

2.3.121 The compound will also be used to manage the construction of the following structures:

- WCML box structure, along with the A573 Wigan Road satellite compound, which will take four years and six months to complete; and
- Footpath Ashton-in-Makerfield 22/30 accommodation underbridge, which will take one year and three months to complete.

2.3.122 The compound, along with A573 Wigan Road satellite compound, will also be used to manage the construction of the following earthworks:

- Abram embankment retaining walls, which will take three years and six months to complete;
- Abram cutting retaining walls, which will take three years and nine months to complete; and
- Abram cutting, which will take two years to complete.

2.3.123 The compound will contain storage, prefabrication and laydown areas for a period of four years and nine months. It will be used to manufacture and store concrete elements, such as viaducts and bridge beams, and will facilitate the construction of WCML box structure and Abram embankment retaining walls. It will be accessed from the A58 Lily Lane.

2.3.124 The works to be managed from this compound and A573 Wigan Road satellite compound will also require the permanent realignment of the A573 Wigan Road, which will take three years and three months to complete. During construction, the existing road will remain open and temporary traffic management measures will be implemented. On completion of construction, traffic management measures will be implemented for three months to enable connection between the realigned section of road and the existing road.

2.3.125 The works to be managed from this compound will require the following works to PRoW:

- temporary closure of Footpath Ashton-in-Makerfield 24/10 for a period of two years and three months during construction of the A573 Wigan Road realignment. During construction users will be diverted along Footpath Ashton-in-Makerfield 25/20 to the existing A573 Wigan Road alignment increasing journey length by 409m. On completion of construction the footpath will be permanently realigned under Hey Brook offline overbridge;
- temporary closure of Footpath Ashton-in-Makerfield 22/30 for a period of one year during construction of Footpath Ashton-in-Makerfield 22/30 accommodation underbridge. During construction users will be diverted along Footpath Ashton-in-Makerfield 22/10, Footpath Abram 01/10, the A58 Lily Lane and the Leeds and Liverpool Canal towpath, increasing journey length by 2.3km. On completion of construction users will be diverted via realigned Footpath Ashton-in-Makerfield 22/30 accommodation access underbridge; and
- temporary closure of Footpath Abram 02/10 for a period of three years and nine months during the WCML connection works. During construction users will be diverted via the A58 Lily Lane and the Leeds and Liverpool Canal towpath, increasing journey length by 262m. On completion of construction Footpath Abram 02/10 will be permanently diverted along a new alignment parallel to the Proposed Scheme.

2.3.126 The works to be managed from this compound will require the following watercourse diversions and drainage works:

- permanent diversion of Tributary of Hey Brook 5, which will take three months to complete;
- permanent realignment of Coffin Lane Brook, which will take six months to complete;
- permanent realignment of Tributary of Coffin Lane Brook 1, which will take three months to complete;
- Hey Brook tributary culvert, which will take nine months to complete;
- Coffin Lane Brook culvert, which will take six months to complete; and
- Hey Brook culvert and Heybrook offline culvert, which will take six months to complete.

2.3.127 The works to be managed from this compound will require utility works including, the permanent diversion of a minor Electricity North West 11kV overhead line, which will take three months to complete.

2.3.128 The compound will manage construction and installation of the A58 Lily Lane telecommunications site, which will take six months to complete.

2.3.129 The compound will also be used to manage the connection works to the WCML, and railway systems installation works at Lily Lane, which will take six years and three months to complete.

Winstanley Road satellite compound

2.3.130 This compound will be used to manage railway systems works (see Volume 2: MA05 Map Book, map CT-05-334, C4). It will be accessed from the A58 Lily Lane to the west of the route of the Proposed Scheme.

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

2.3.132 The compound will be used to manage the construction and installation of works required to connect the Proposed Scheme with the WCML. The connection works will take place intermittently for a period of six years and three months.

Construction waste and material resources

2.3.133 Excavated material generated across the Proposed Scheme will be reused as engineering fill material or in the environmental mitigation earthworks of the Proposed Scheme, where suitable and reasonably practicable.

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

2.3.135 Local excess or shortfall of excavated material within the Risley to Bamfurlong area will be managed through the mitigation earthworks design approach adopted for the Proposed Scheme, as well as the use of borrow pits in other community areas, 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, Section 15.

2.3.136 Forecasts of the amount of waste generated at temporary worker accommodation sites will be reported in Volume 3, Section 15.

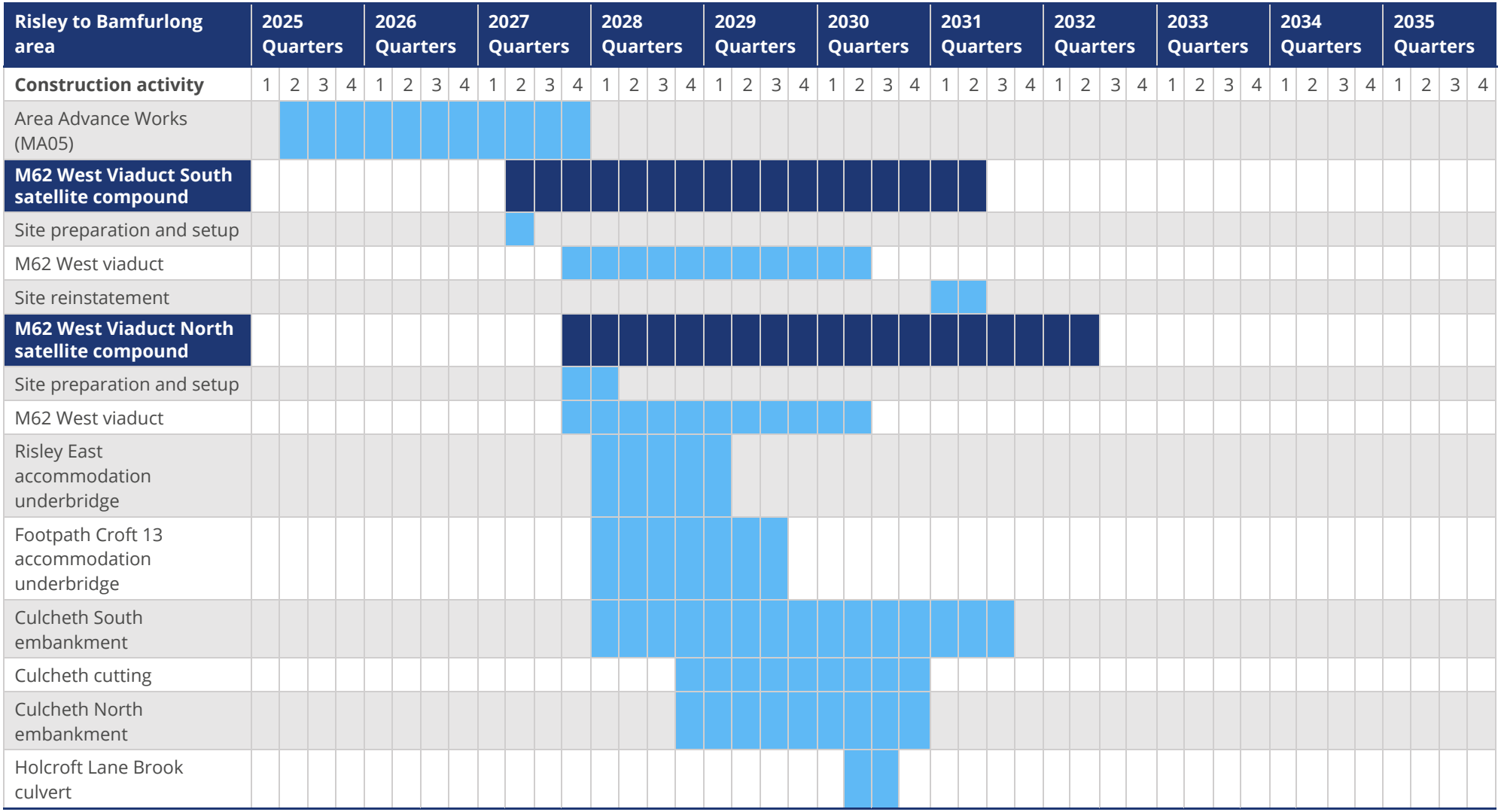
Commissioning of the railway

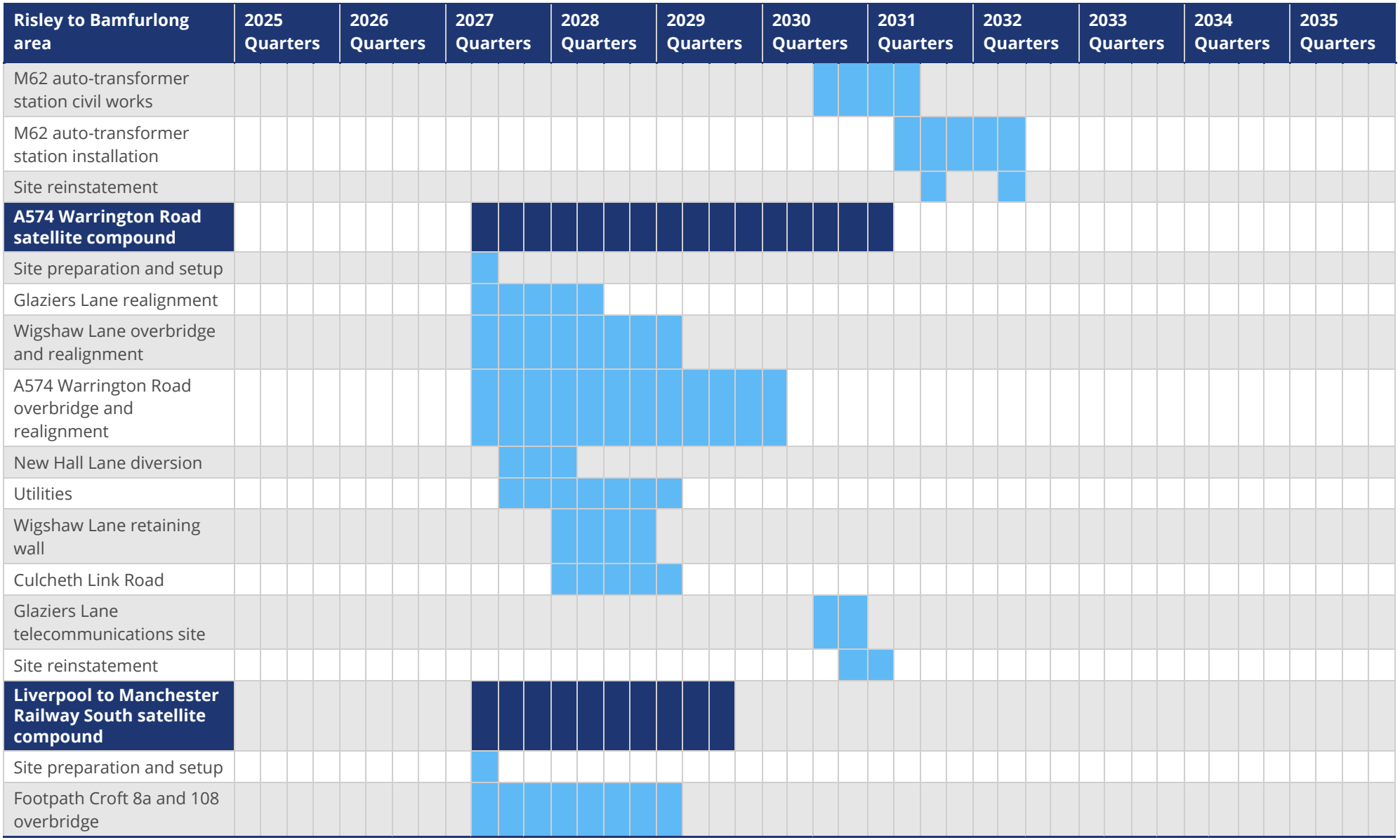
2.3.137 Commissioning is the process of testing the infrastructure to ensure that it operates as expected. It will be carried out in the period prior to opening. Further details are provided in Volume 1, Section 6.

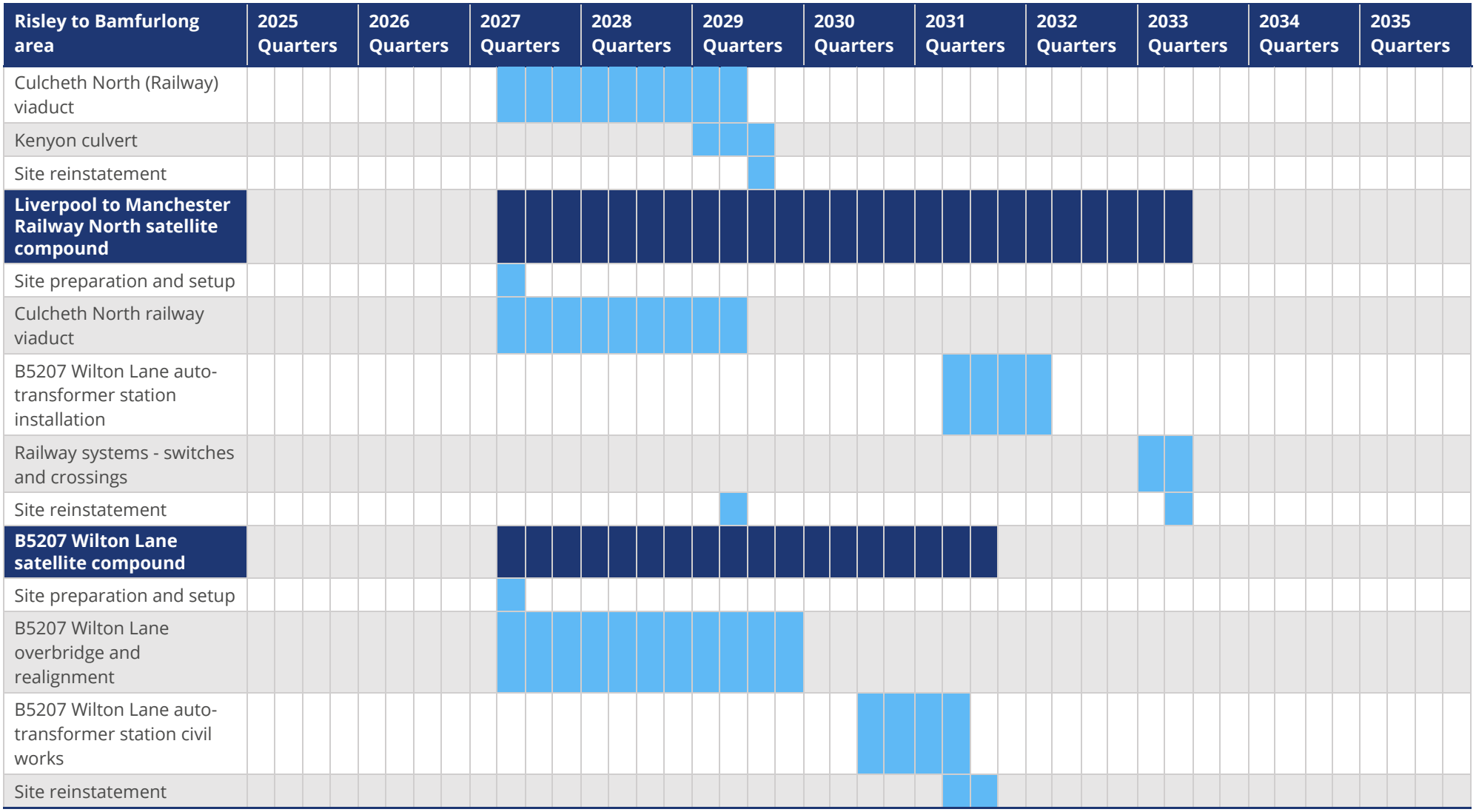
Construction programme

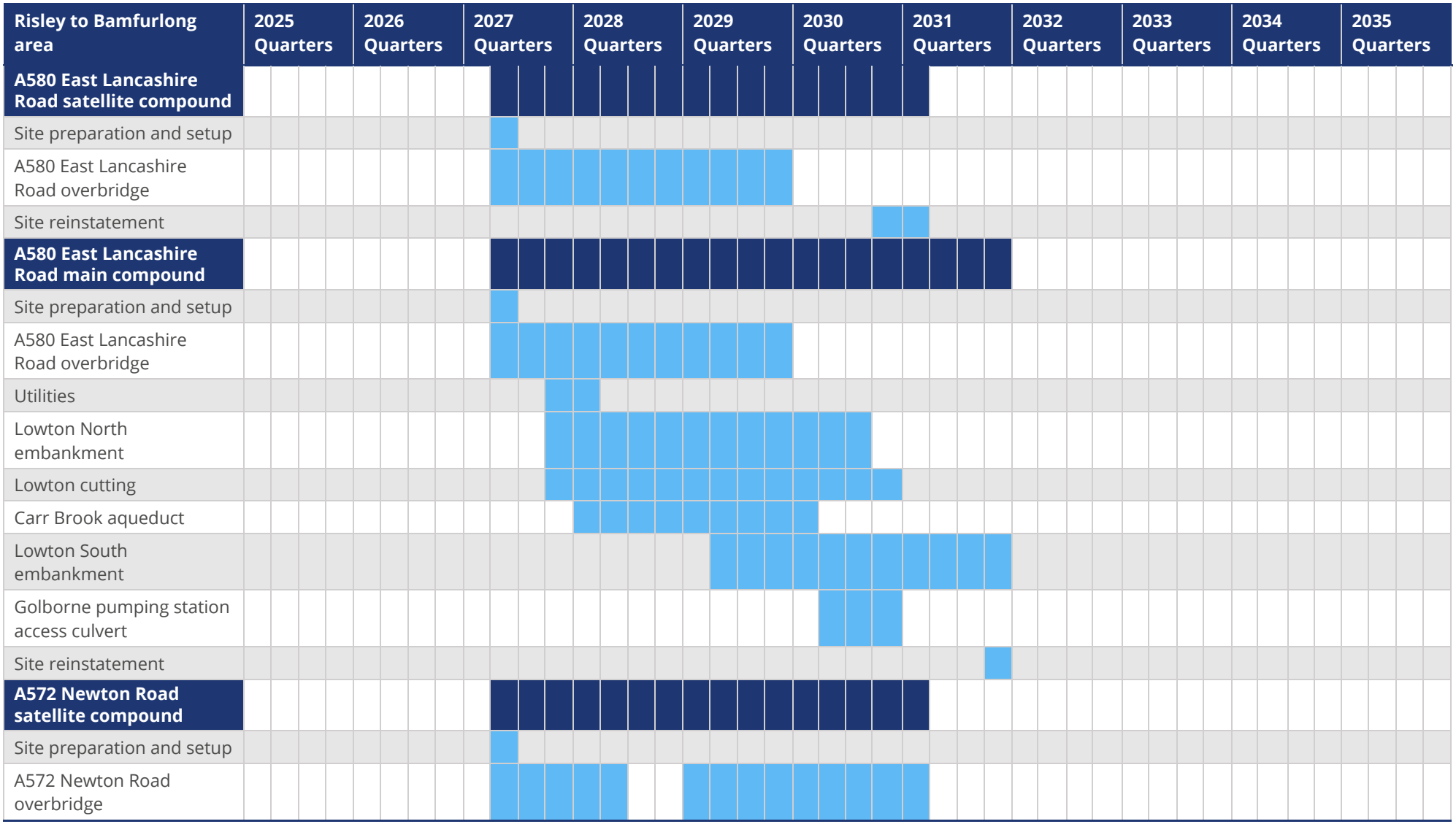
2.3.138 A construction programme illustrating indicative periods for each of the core construction activities described above is provided in Figure 8.

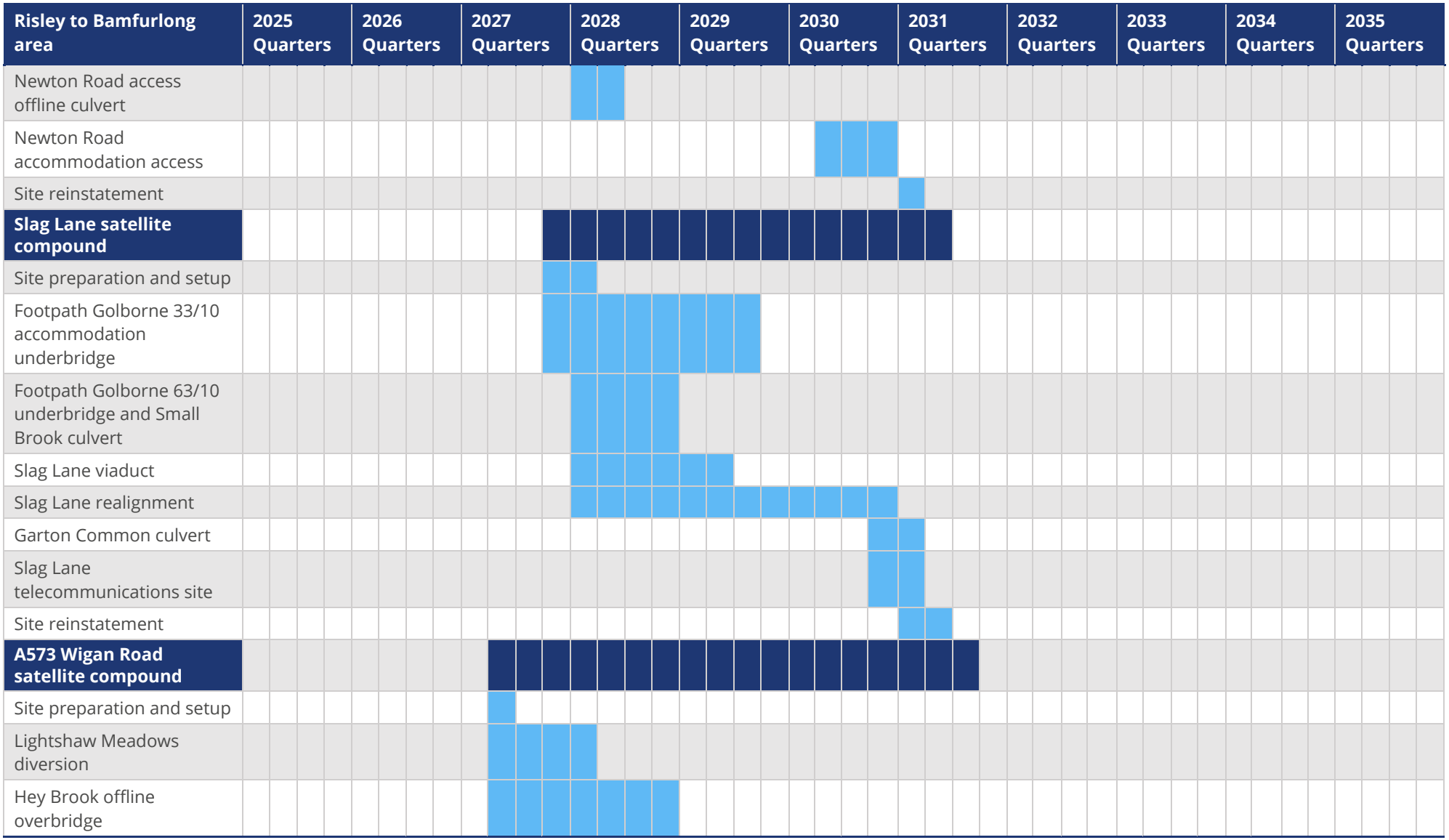
Figure 8: Indicative construction programme between 2025 and 2035



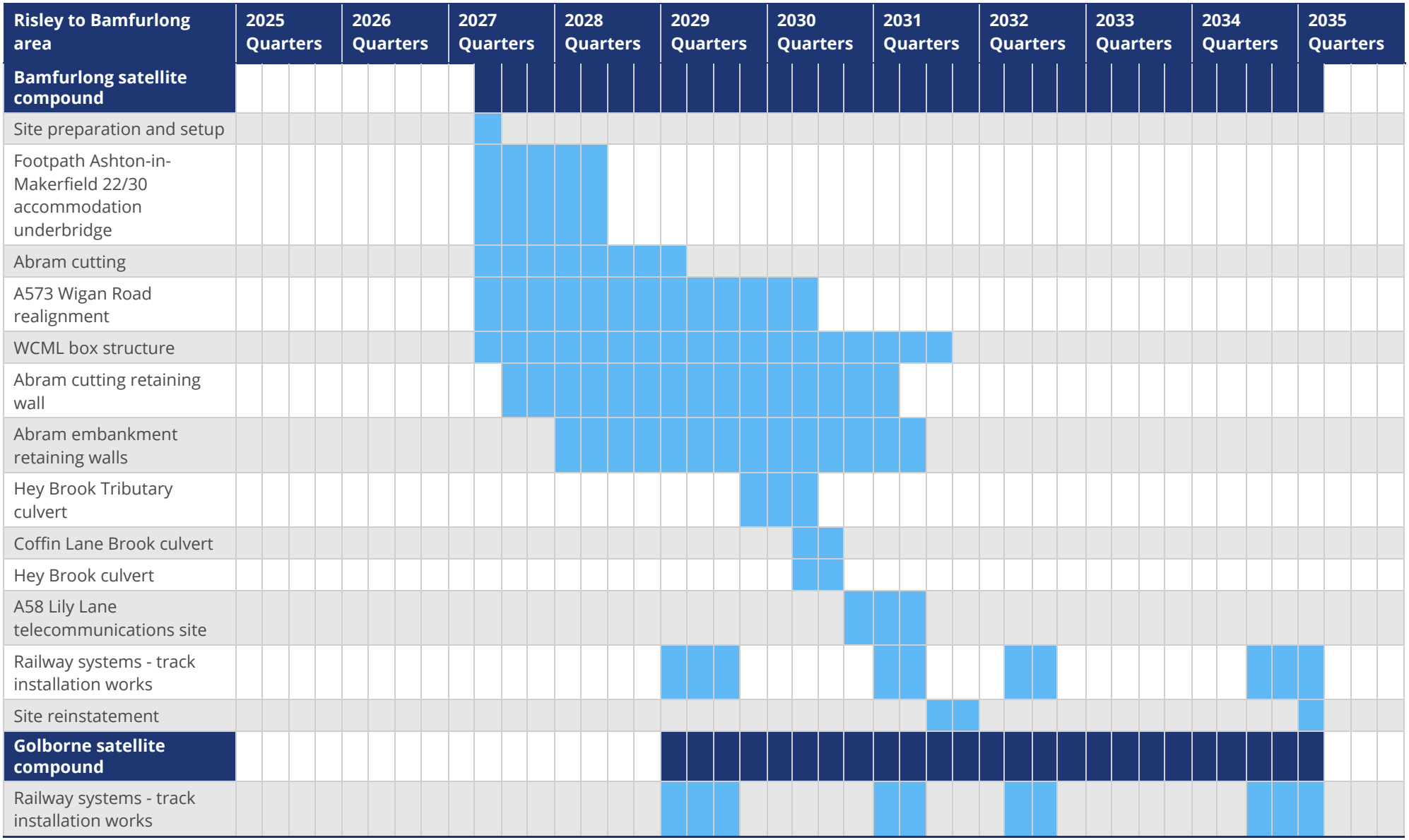

Risley to Bamfurlong area
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
2034 Quarters
2035 Quarters
M62 auto-transformer station civil works
M62 auto-transformer station installation
Site reinstatement
A574 Warrington Road satellite compound
Site preparation and setup
Glaziers Lane realignment
Wigshaw Lane overbridge and realignment
A574 Warrington Road overbridge and realignment
New Hall Lane diversion
Utilities
Wigshaw Lane retaining wall
Culcheth Link Road
Glaziers Lane telecommunications site
Site reinstatement
Liverpool to Manchester Railway South satellite compound
Site preparation and setup
Footpath Croft 8a and 108 overbridge

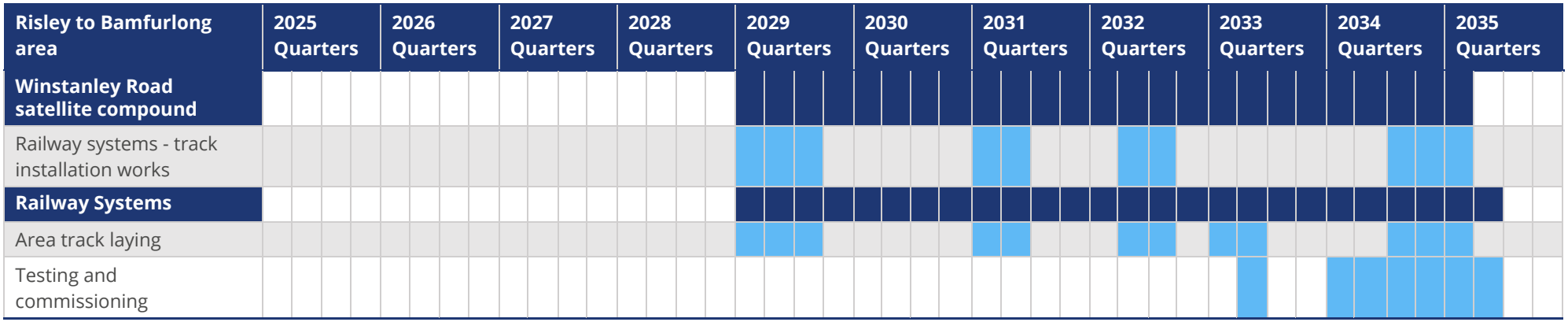

Risley to Bamfurlong area
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
2034 Quarters
2035 Quarters
Culcheth North (Railway) viaduct
Kenyon culvert
Site reinstatement
Liverpool to Manchester Railway North satellite compound
Site preparation and setup
Culcheth North railway viaduct
B5207 Wilton Lane auto-transformer station installation
Railway systems - switches and crossings
Site reinstatement
B5207 Wilton Lane satellite compound
Site preparation and setup
B5207 Wilton Lane overbridge and realignment
B5207 Wilton Lane auto-transformer station civil works
Site reinstatement


Risley to Bamfurlong area
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
2034 Quarters
2035 Quarters
A580 East Lancashire Road satellite compound
Site preparation and setup
A580 East Lancashire Road overbridge
Site reinstatement
A580 East Lancashire Road main compound
Site preparation and setup
A580 East Lancashire Road overbridge
Utilities
Lowton North embankment
Lowton cutting
Carr Brook aqueduct
Lowton South embankment
Golborne pumping station access culvert
Site reinstatement
A572 Newton Road satellite compound
Site preparation and setup
A572 Newton Road overbridge


Risley to Bamfurlong area
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
2034 Quarters
2035 Quarters
Newton Road access offline culvert
Newton Road accommodation access
Site reinstatement
Slag Lane satellite compound
Site preparation and setup
Footpath Golborne 33/10 accommodation underbridge
Footpath Golborne 63/10 underbridge and Small Brook culvert
Slag Lane viaduct
Slag Lane realignment
Garton Common culvert
Slag Lane telecommunications site
Site reinstatement
A573 Wigan Road satellite compound
Site preparation and setup
Lightshaw Meadows diversion
Hey Brook offline overbridge

Risley to Bamfurlong area	2025 Quarters	2026 Quarters	2027 Quarters	2028 Quarters	2029 Quarters	2030 Quarters	2031 Quarters	2032 Quarters	2033 Quarters	2034 Quarters	2035 Quarters
Abram cuttings											
A573 Wigan Road realignment											
Lightshaw Lane diversion											
WCML box structure											
A573 Wigan Road viaducts											
Abram Cutting retaining wall											
Abram embankment retaining walls											
Nan Holes Brook offline culvert											
Hey Brook Tributary offline culvert											
Aye Bridge embankment retaining wall											
Footpath Golborne 31/10 underbridge and Critchley culvert											
Footpath Golborne 27/10 underbridge and Windy Bank culvert											
Nan Holes Brook culvert											
Lightshaw Lane telecommunications site											
Site reinstatement											


Risley to Bamfurlong area
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
2034 Quarters
2035 Quarters
Bamfurlong satellite compound
Site preparation and setup
Footpath Ashton-in-Makerfield 22/30 accommodation underbridge
Abram cutting
A573 Wigan Road realignment
WCML box structure
Abram cutting retaining wall
Abram embankment retaining walls
Hey Brook Tributary culvert
Coffin Lane Brook culvert
Hey Brook culvert
A58 Lily Lane telecommunications site
Railway systems - track installation works
Site reinstatement
Golborne satellite compound
Railway systems - track installation works


Risley to Bamfurlong area
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
2034 Quarters
2035 Quarters
Winstanley Road satellite compound
Railway systems - track installation works
Railway Systems
Area track laying
Testing and commissioning

Monitoring during construction

2.3.139 The appointed contractor will 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 will be reported to the nominated undertaker and remedial action identified.

2.4 Operation of the Proposed Scheme

Introduction

2.4.1 This section describes the operational characteristics of the Proposed Scheme in the Risley to Bamfurlong 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 will be up to three trains per hour each way passing through the Risley to Bamfurlong area. Services are expected to operate between 05:00 and midnight from Monday to Saturday and between 08:00 and midnight on Sunday.

2.4.3 In this area, trains will run at speeds of up to 200mph (320kph). The trains will 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 Provision for railway maintenance vehicles along Proposed Scheme will be made at Crewe North rolling stock depot (RSD) in the Wimboldsley to Lostock Gralam area (MA02). Further information on Crewe North RSD can be found in Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02).

Operational waste and material resources

2.4.6 The assessment of the likely significant environmental effects associated with the disposal of operational waste has been undertaken for the Proposed Scheme as a whole and is reported in Volume 3, Section 15.

2.4.7 Forecasts of the amount of waste arising from track maintenance and ancillary infrastructure and the associated potential significant environmental effects are provided in Volume 5: Appendix WM-001-00000.

Monitoring during operation

2.4.8 The nominated undertaker will be responsible for monitoring during operation of the Proposed Scheme. General monitoring measures during operation are set out in area-specific monitoring measures for each environmental topic area, which are presented in Sections 4 to 15 of this report.

2.4.9 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

Introduction

2.5.1 The Proposed Scheme described in Section 2.2 has been selected following design development, which included consideration of environmental impacts.

2.5.2 The Alternatives Report (Volume 5: Appendix CT-003-00000) describes the local alternatives considered as part of the design development of the Proposed Scheme. Local alternative options for the following elements of the Proposed Scheme in the Risley to Bamfurlong area are reported in Volume 5:

- A574 Warrington Road realignment;
- Wigshaw Lane;
- A573 Wigan Road realignment; and
- Lily Lane junction.

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 stakeholder engagement and 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 Feedback from stakeholder engagement and the consultations on the working draft Environmental Statement (ES) and design refinements has been considered as part of the design and assessment of the Proposed Scheme presented in this ES.

3.2 Key stages of Phase 2b engagement and consultation

3.2.1 This section provides a summary of consultation activities and engagement undertaken or underway in the Risley to Bamfurlong area since the initial preferred route announcement. This summary of engagement is in addition to the route-wide engagement outlined in Volume 1, Section 3.

Draft EIA Scope and Methodology Report (SMR) consultation

3.2.2 The draft EIA SMR (the 2017 SMR) was consulted on between July and September 2017 and was issued to statutory bodies, non-government organisations and local authorities. It was made available on the gov.uk website, allowing comment by local interest groups and the public. A total of 107 responses to the 2017 SMR were received, as a result of which changes were made. A revised EIA SMR was published in October 2018 (the 2018 SMR) as part of the working draft ES (described in the following section).

3.2.3 The changes between the draft 2017 SMR and the publication of the 2018 SMR were set out in the EIA SMR Consultation Report[9] also published in October 2018. The assessment set out in this ES follows the scope and methodology in the EIA SMR[10] in Volume 5 of this ES.

Consultation on the working draft ES

3.2.4 As set out in Volume 1 Section 3, two parallel consultations were undertaken by HS2 Ltd in 2018: a consultation on the working draft ES and a consultation on the working draft EQIA. These consultations were relating to the full Phase 2b Scheme (including both Eastern Leg and Western Leg). As part of the process of consultation, stakeholders were invited to comment on the full Phase 2b scheme and the working draft ES and working draft EQIA Report. Documents were made available on the gov.uk website.

3.2.5 As part of the consultation, information events were held in communities along both the Eastern and Western legs of the full Phase 2b route. Within the Risley to Bamfurlong area, events were held at Culcheth and Golborne (December 2018).

3.2.6 A total of 37,899 responses were received through the consultation on the working draft ES. These responses were analysed. The themes and issues relevant to the Risley to Bamfurlong area included commentary on:

- increased impact on local traffic flows due to the proposed temporary and permanent highways diversions, particularly in and around Culcheth and Lowton, including the closure of Wigshaw Lane and realignment of the A574 Warrington Road and Slag Lane;
- access to public rights of way (PRoW) and open access land, including permissive paths, both during construction and operation, and permanent PRoW realignments, particularly to the south and east of Culcheth and at Byrom Wood;
- impact on local amenities such as recreational playing fields south of Culcheth and Hesketh Meadows Playing Fields in Lowton, Culcheth Linear Park, Byrom Wood and Abram Flashes Site of Specific Scientific Interest (SSSI);
- proximity of the Proposed Scheme to Holcroft Moss SSSI (part of the wider Manchester Mosses Special Area of Conservation (SAC)) and Abram Flashes SSSI and the potential impacts on hydrological interfaces at both sites; and
- location of A580 East Lancashire Road main compound near to Lowton Junior and Infant School and associated noise, air quality, visual and traffic impacts.

[9] High Speed Two Ltd (2018), HS2 Phase 2b: Crewe to Manchester and West Midlands to Leeds, *Environmental Impact Assessment Scope and Methodology Report, Consultation Summary Report*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/745512/HS2_Phase_2b_EIA_Scope_and_Methodology_Report_Consultation_Summary_Report.pdf.

[10] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

3.2.7 A working draft ES Consultation Summary Report[11] has been published as part of the ES detailing how consultation responses have been taken into consideration in the development of the Proposed Scheme design and its assessment.

3.2.8 Feedback from that consultation and ongoing stakeholder engagement have been considered as part of the development of the Proposed Scheme, and the assessment and identification of mitigation opportunities for the Risley to Bamfurlong area.

Consultation on design refinements

3.2.9 There were no route refinements consulted on in the Risley to Bamfurlong area, although the scheme's design and mitigation has continued to evolve, taking in to account ongoing assessment and stakeholder feedback. Further detail on the approach to consultation and route-wide engagement is outlined in Volume 1, Section 3.

3.3 Engagement and consultation with stakeholder groups

Communities

3.3.1 Community stakeholders in the Risley to Bamfurlong 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.

3.3.2 The purpose of this engagement has been to provide affected communities with information on the development of the Proposed Scheme and to give the opportunity to raise issues in relation to the design and assessment of the Proposed Scheme. Feedback from communities has helped inform the baseline information and evolving assessment of impacts in this ES and concurrent EQIA, as well as identify opportunities for mitigation within the design.

3.3.3 Programmes of public information events were held to share new information with communities and engage them on it. HS2 Ltd notified people of these by sending leaflets to addresses along the route, advertising in local media and via social media. Public information events were held in September 2017, between June and July 2018, October and December 2018, June and July 2019, In October and November 2020, information events were held using online channels including webinars and a virtual exhibition room. Information events were held in June and July 2021 using a combination of in-person information events and online webinars. Members of local communities and other interested parties were invited to engage on issues pertinent to the development of the Proposed Scheme design and its assessment.

[11] Volume 5: Appendix CT-007-00001, Working Draft Environmental Statement Consultation Summary Report.

3.3.4 Engagement has been, and will continue to be, undertaken with community stakeholders, particularly those close to the Proposed Scheme. These stakeholders include educational establishments, organisations with specialist interests or those catering to the needs of vulnerable people within the community. This has informed the assessment of community and health impacts in this ES, whilst also informing the concurrent EQIA.

3.3.5 Table 4 summarises key engagement undertaken with community stakeholders to date, including the focus of the engagement and how this has informed the design and assessment of the Proposed Scheme.

Table 4: Engagement to date with community stakeholders

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Abram Bryn Gates Primary School	Meeting to discuss the Proposed Scheme and provide an update on consultation activities. Discussions also held around accessibility, catchment areas and school activities.	Information has been used to improve understanding of baseline conditions, inform the community assessment and provide an opportunity to consider any mitigation that may be required, as well as identify any educational opportunities.
Bamfurlong Neighbourhood Group	Meeting to inform the group about the Proposed Scheme and the consultation process, collate local data and understand their areas of interest and concern. This included concerns regarding the connection with the existing West Coast Main Line (WCML) at Bamfurlong and associated impacts relating to noise, visual and traffic both during construction and operation.	Information used to improve understanding and inform assessment of baseline conditions and provide an opportunity to consider any mitigation that may be required.
Birchwood Primary School	Meeting to discuss the Proposed Scheme and provide an update on consultation activities. Discussions also held around accessibility, catchment areas and school activities.	Information has been used to improve the understanding of baseline conditions, inform the community assessment and provide an opportunity to consider any mitigation that may be required, as well as identify any educational opportunities.
Birchwood Secondary School	Meeting to discuss the Proposed Scheme and provide an update on consultation activities. Discussions also held around accessibility, catchment areas and school activities.	Information has been used to improve understanding of baseline conditions, inform the community assessment, and provide an opportunity to consider any mitigation that may be required, as well as identify any educational opportunities.
British Cycling	Meeting to discuss the Proposed Scheme and potential impacts on the cycle network in the local area.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required.
Compassion in Action (Charity)	Meeting to inform the group on the Proposed Scheme and consultation activities. Also provided opportunity to understand areas of interest, collate local information and understand perspectives on community engagement with vulnerable groups.	Information has been used to improve understanding of baseline conditions and provide an opportunity to consider and discuss any mitigation that may be required.

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Croft Primary School	Meeting to discuss the Proposed Scheme and provide an update on consultation activities. Discussions also held around accessibility, catchment areas and school activities.	Information used to improve understanding and inform assessment of baseline conditions as well as potential impacts on the school and any mitigation that may be required.
Culcheth and District Rail Action Group	To inform the group about the Proposed Scheme and the consultation process, collate local data and understand their areas of interest and concern. This included concerns regarding the closure of Wigshaw Lane; visual and noise impacts during both construction and operation; loss of recreational green space; and impact on Partridge Lakes Fishery and other local businesses.	Information used to improve understanding and inform assessment of baseline conditions as well as potential impacts across the community and any mitigation that may be required. In response to local engagement there have been several changes to the Proposed Scheme in this area, including the realignment of Wigshaw Lane to avoid the previously proposed closure, the realignment of A574 Warrington Road to avoid direct impacts on local recreational playing fields and maintain access to Partridge Lakes Fishery via Glaziers Lane.
Culcheth Athletic Football Club	Meeting to discuss the Proposed Scheme, in particular, potential impacts on the football club including accessibility and long-term viability during construction and operation.	Information used to improve understanding of baseline conditions of the Proposed Scheme as well as understand potential impacts and mitigation opportunities. In response to local engagement, there has been a revision to the highways design of A574 Warrington Road to avoid a direct impact on the football club.
Culcheth Library	Meeting to discuss the Proposed Scheme and provide an update on consultation activities.	Information used to improve the understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required.
East Leigh Junior Football Club	Meeting to discuss the proposed relocation of the Hesketh Meadows Playing Fields and an opportunity to inform the EQIA assessment through an understanding of their areas of interest and collate local information.	Information has been used to improve understanding of baseline conditions and provide an opportunity to consider and discuss any mitigation that may be required.
Imagine, Act and Succeed (Charity)	Meeting to discuss the Proposed Scheme, provide an update on consultation activities and understand any impacts relating to the EQIA.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required.
Lowton East Neighbourhood Development Forum	To inform the group about the Proposed Scheme and the consultation process, collate local data and understand their areas of interest and concern. This included concerns over A572 Newton Road traffic congestion and traffic safety, construction impacts and location of the compound near Lowton, impacts on Lowton Business Park, and impacts on Hesketh Meadow playing fields close to the former Civic Centre.	Information used to improve understanding of baseline conditions and potential impacts on the local community and provide an opportunity to consider any mitigation that may be required. In response to local engagement feedback, provision has also been included within the Proposed Scheme for the relocation of Hesketh Meadows Playing Fields.

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Lowton Junior and Infant School	Meeting to discuss the Proposed Scheme and provide an update on consultation activities. Discussions also held around accessibility, catchment areas and school activities and the potential impacts associated with the proximity of A580 East Lancashire Road main compound and consideration of mitigation measures, including enhancements, where necessary. This also provided an opportunity to inform the EQIA,	Information has been used to improve understanding of baseline conditions, inform the community assessment and EQIA, and provide an opportunity to consider any mitigation that may be required. As part of engagement feedback received, A580 East Lancashire Road main compound has been moved slightly further south to increase the distance to the school.
Lowton West Residents Group	To inform the group about the Proposed Scheme and the consultation process, collate local data and understand their areas of interest and concern. This included concerns over Byrom Wood and surrounding estate, local PRoW and impacts on flood risk and the local environment.	Information used to improve understanding of baseline conditions as well as potential impacts and provide an opportunity to consider any mitigation that may be required.
Residents of Robins Lane	Discussion to ensure the residents of Robins Lane directly affected by Wigshaw Lane realignment proposals were fully informed.	Information used to improve understanding of baseline conditions as well as potential impacts and provide an opportunity to consider any mitigation that may be required, particularly the design of junction between Wigshaw Lane and Robins Lane due to specific circumstances arising from business operations in Robins Lane.
Scouts of Croft and Hollins Green	Meeting to discuss the Proposed Scheme, discuss opportunities it may provide for younger people and provide an update on consultation activities.	Information has been used to improve understanding of baseline conditions, inform the community assessment, and provide an opportunity to consider any mitigation that may be required.
Warrington Ethnic Communities Association	Meeting to inform the group on the Proposed Scheme and consultation activities. This also provided an opportunity to understand members' areas of interest, collate local information and understand perspectives on engagement with ethnic community groups.	Information has been used to improve understanding of baseline conditions, inform the community assessment, and provide an opportunity to consider any mitigation that may be required.
Warrington High School	Meeting to discuss the Proposed Scheme and provide an update on consultation activities. Discussions also held around accessibility, catchment areas and school activities.	Information used to improve understanding and inform assessment of baseline conditions as well as potential impacts on the school and any mitigation that may be required.
Warrington Islamic Association	Meeting to provide an update on the Proposed Scheme and consultation activities. This also provided an opportunity to understand potential impacts on the local Islamic community and particularly patterns of movement within the congregation.	Information has been used to improve understanding of baseline conditions, inform the community assessment, and provide an opportunity to consider any mitigation that may be required.

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Warrington Voluntary Action Group	To provide an update on the Proposed Scheme, including discussions with three schools with a Special Educational Needs base covering the area of Warrington (Green Lane, Woolston Brook and Fox Wood). Discussion held regarding construction traffic, highway realignments, catchment areas and school activities.	Information has been used to improve understanding of baseline conditions, inform the community assessment and provide an opportunity to consider any mitigation that may be required.
Wigan Business Forum	Engagement with business community to explain opportunities offered by Proposed Scheme that would benefit local businesses, particularly in relation to improved connectivity and economic regeneration potential.	Information used to improve business understanding of the Proposed Scheme to promote proactive engagement and opportunities for local businesses.
Wigan Careers Conference	Engagement with local community to explain opportunities and careers related to the Proposed Scheme.	Information used to improve local community understanding of the Proposed Scheme and to promote associated educational opportunities.

MPs, local authorities and parish councils

3.3.6 HS2 Ltd has offered to engage with all relevant MPs during the development of the Proposed Scheme in order to discuss key issues and concerns.

3.3.7 Direct engagement has also been offered to and undertaken with metropolitan, borough, district and parish councils within the Risley to Bamfurlong area. The purpose of this engagement was 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.

3.3.8 Table 5 summarises key engagement undertaken with MPs local authorities and parish councils to date, including the focus of the engagement and how this has informed the design and assessment of the Proposed Scheme.

Table 5: Engagement to date with MPs, local authorities and parish councils

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Charlotte Nichols, MP for Warrington North	Engagement to discuss the Proposed Scheme and seek feedback on areas of local interest, including concerns raised by a local constituent.	Feedback has been used to improve understanding of key areas of local interest and provide opportunity for further discussion.
Helen Jones, former MP for Warrington North	Engagement through constituent letters, particularly regarding impacts at Hollins Green, and via debate in Westminster Hall and engagement with Nusrat Ghani who served as Parliamentary Under-Secretary of State at the Department for Transport.	Information used to gather feedback on the Proposed Scheme.

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
James Grundy, MP for Leigh	Engagement to discuss concerns including the submission of a petition of objection against the Golborne Link.	Information used to gather feedback on the Proposed Scheme.
Joanne Platt, former MP for Leigh	Engagement to discuss the Proposed Scheme and provide an update on consultation activities. Meetings have been held with the MP's assistant to discuss social mobility, transport links, connectivity and economic regeneration opportunities.	Feedback informed the planning of engagement and consultation in the area as well as understanding key areas of interest for further discussion.
Greater Manchester Combined Authority	Meetings to provide information on the Proposed Scheme with a particular focus on wider impacts relating to highways, traffic and transport.	Information has been used to improve understanding of baseline conditions and provide an opportunity to consider and discuss any mitigation that may be required.
St Helens Borough Council	Discussion and sharing of information on the Proposed Scheme with a particular focus on wider impacts relating to highways, air quality, traffic and transport.	Information has been used to improve understanding of baseline conditions and provide an opportunity to consider and discuss any mitigation that may be required.
Warrington Borough Council	Series of meetings to discuss the Proposed Scheme, provide updates on consultation activities and understand potential impacts on the local community. Key discussion points included the closure and diversion of Wigshaw Lane, PRoW access, noise, and landscape and visual impacts throughout the area. Specific meetings held for members to discuss traffic movements in and around Lymm.	Feedback used to inform understanding of baseline conditions, potential impacts and proposed mitigation concerns and opportunities. In response to local engagement there have been a number of changes to the Proposed Scheme in this area, including a revised highways design with provision for Wigshaw Lane to be realigned and remain open and the realignment of A574 Warrington Road to avoid direct impacts on local recreational playing fields used by Culcheth Athletic Junior Football Club.
Wigan Metropolitan Borough Council	Series of meetings to discuss the Proposed Scheme, provide updates on consultation activities and understand potential impacts on the local community. Key discussion points included the impacts of construction traffic on local highways, PRoW access and proposed temporary and permanent realignments and impacts on Hesketh Meadows Playing Fields and Byrom Wood and the development of the Wigan Growth Strategy and Town Centre masterplan Specific meetings held with members to discuss design of constrained junctions within Lowton and at Platt Bridge.	Feedback used to inform understanding of baseline conditions, potential impacts and proposed mitigation concerns and opportunities. Feedback was also used to inform the planning of engagement activities in the local community. In response to local engagement, there have been a number of changes to the Proposed Scheme in this area, including a revision to the highways design for A573 Wigan Road to reduce severance and isolation of agricultural land and reduce landscape and visual impacts. Provision has also been included for the relocation of Hesketh Meadows Playing Fields following engagement with the local authority.
Culcheth and Glazebury Parish Council	Series of meetings to discuss the Proposed Scheme, provide updates on consultation activities and understand potential impacts on the local community. Key discussion points included the closure and diversion of Wigshaw Lane, PRoW access, noise, and landscape and visual impacts, both during construction and operation.	Information used to improve understanding and inform assessment of baseline conditions as well as potential impacts across the community and any mitigation that may be required. In response to local engagement there have been a number of changes to the Proposed Scheme in this area, including a revised highways design with provision for Wigshaw Lane to be realigned and

Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
		remain open, the realignment of A574 Warrington Road to avoid direct impacts on local recreational playing fields used by Culcheth Athletic Junior Football Club and to maintain access to Partridge Lakes Fishery via Glaziers Lane.
Croft Parish Council	Meetings to discuss the Proposed Scheme and consultation activities, collate local information and understand areas of interest and concern, particularly relating to Croft and connectivity with Culcheth.	Information used to improve understanding of baseline conditions and assessment of the Proposed Scheme as well potential impacts on the local community. In response to local engagement, there have been a number of changes to the Proposed Scheme in this area, including a revised highways design with provision for Wigshaw Lane to be realigned and remain open, maintaining direct connectivity between Croft and Culcheth.

3.3.9 Local authorities and parish councils will continue to be engaged as part of the development of the Proposed Scheme with ongoing dialogue on key topics such as highways, PRoW and the draft Code of Construction Practice (CoCP)[12].

Expert, technical and specialist groups

3.3.10 Engagement has been undertaken with technical and specialist organisations to provide appropriate specialist input to inform the design and assessment of the Proposed Scheme. This includes engagement with statutory bodies, local authorities and utility companies operational within the Risley to Bamfurlong area.

3.3.11 Engagement with statutory bodies, local authorities and utility companies within the Risley to Bamfurlong area has been undertaken in order to:

- collate local baseline information;
- identify and understand issues and concerns; and
- provide a mechanism for ongoing dialogue and discussion on the assessment and design development.

3.3.12 Engagement has focused on the technical areas that inform the assessment, including air quality, landscape and visual, sound, noise and vibration and traffic and transport. Briefings were offered to specialist and technical stakeholders across the Proposed Scheme during the period of consultation on the working draft ES to provide information on the evolving design and assessment of the Proposed Scheme in their respective areas.

3.3.13 Engagement has been offered to blue light emergency service stakeholders including fire and rescue, police force and ambulance service providers, with meetings undertaken to

[12] Volume 5: Appendix CT-002-00000, Draft Code of Construction Practice.

share information on the Proposed Scheme. This has included design review meetings to present design detail on fire engineering and safety design aspects of the Proposed Scheme.

3.3.14 Engagement will continue with these stakeholders as the project progresses, including consultation to support the development of local traffic management plans prior to construction starting.

3.3.15 Table 6 includes engagement undertaken with technical and specialist groups and how this has informed the design and assessment of the Proposed Scheme in the Risley to Bamfurlong area.

Table 6: Engagement to-date with expert, technical and specialist groups

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Statutory and national	British Geological Survey	Geological conditions	Information has been used to improve understanding of baseline geological issues route-wide and to refine the assessment and any proposed mitigation.
Statutory and national	Canal & River Trust	Waterways	Information has been used to inform the historic environment, ecological, and landscape and visual assessment and improve understanding of baseline conditions for route-wide application, including the water resources and flood risk assessment.
Statutory and national	Coal Authority	Coal mining	Information has been used to improve understanding of baseline conditions for coal mining route-wide, informing the assessment and proposed mitigation.
Statutory and national	Department for Environment, Food and Rural Affairs	Agriculture and land quality issues	Informed agricultural and land quality assessment methodology, baseline conditions for route-wide application, assessment and proposed mitigation.
Statutory and national	Environment Agency	Land quality, ecology and biodiversity and water and flood risk issues	Informed land quality, ecology and biodiversity, water resources, surface water flood risk and Water Framework Directive methodology. Improved understanding of baseline conditions, (including the provision of data), along the route of the Proposed Scheme and the proposed mitigation, including at Holcroft Moss SSSI (part of the wider Manchester Mosses SAC), Abram Flash SSSI and at the restored Risley Landfill.
Statutory and national	Animal and Plant Health Agency (APHA)	Land quality issues	Information on the location of farm burial and pyre sites associated with the 1967/8 and 2001 outbreaks of foot and mouth disease as well as anthrax infected cattle burial sites has been obtained from APHA. This has been used to improve understanding of land contamination baseline conditions along the route of the Proposed Scheme and to inform the assessment and proposed mitigation.

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Statutory and national	Forestry Commission	Forestry, ecology and landscape issues	Informed ecological and landscape assessment methodology, baseline conditions, assessment, and proposed mitigation.
Statutory and national	Highways England	Strategic road network, traffic and transport issues	Informed the assessment of road network capacity and identification of proposed future works by Highways England, including at the crossing of the Proposed Scheme over the M62.
Statutory and national	Historic England	Nationally designated heritage assets and the heritage assessment methodology	Informed methodology for assessing setting and impacts on historic landscape at national and regional level. Identification and assessment methodology of designated and non-designated heritage assets.
Statutory and national	National Farmers Union	Farming issues	Information was used to improve understanding of route-wide issues for farmers and growers.
Statutory and national	Country Land and Business Association	Farming issues	Information was used to improve understanding of route-wide issues for farmers and growers.
Statutory and national	National Trust	Owned assets and related impacts	Informed considerations around National Trust owned assets route-wide and factors to be considered in the design and assessment of the Proposed Scheme.
Statutory and national	Natural England	Ecology, agricultural land quality and landscape and visual related issues	Provided information regarding the natural environment on a route-wide basis. Informed methodological approach, detailed local conditions and factors to be taken into consideration in the assessment, including opportunities for mitigation at Holcroft Moss SSSI (part of the Manchester Mosses SAC), Abram Flash SSSI and in the valley of the Hey Brook.
Statutory and national	Network Rail	Rail infrastructure	Informed route-wide considerations around the rail infrastructure network and factors to be considered in the design and assessment of the Proposed Scheme, including the proposed connection with the WCML at Bamfurlong.
Statutory and national	Public Health England	Public health issues	Informed methodology and factors to be taken into consideration in the health assessment.
Statutory and national	The Woodland Trust	Woodland and ancient woodland issues	Information was used to confirm that there are currently no sites within the Ancient Woodland Inventory in this area.
Statutory sub-national	Transport for the North	Connectivity to Northern Powerhouse Rail (NPR)	Discussions around integration of HS2 with NPR including where necessary passive provisions in the Proposed Scheme.

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Local Authority technical meetings	Greater Manchester Combined Authority	Meetings to provide information on the Proposed Scheme and obtain relevant baseline information and discuss transport survey requirements and assessment methodology relating to traffic and transport.	Information used to improve understanding of local traffic flows, highways operations and future proposals, and inform the emerging design and assessment of the Proposed Scheme.
Local Authority technical meetings	Greater Manchester Combined Authority	Meeting with technical leads to collate data and discuss the socio-economic environment assessment.	Informed understanding of local baseline conditions and the design and assessment of the Proposed Scheme.
Local Authority technical meetings	St Helens Borough Council	Meeting to provide information on the Proposed Scheme with a particular focus on wider impacts relating to air quality.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required.
Local Authority technical meetings	St Helens Borough Council	Meetings to provide information on the Proposed Scheme and obtain relevant baseline information and discuss transport survey requirements and assessment methodology relating to traffic and transport.	Improved understanding of local traffic flows, highways operations and future proposals, and informed the emerging design and assessment of the Proposed Scheme.
Local Authority technical meetings	Trafford Metropolitan Borough Council	Meeting to provide information on the Proposed Scheme with a particular focus on wider impacts relating to air quality.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required.
Local Authority technical meetings	Transport for Greater Manchester	Meetings to provide information on the Proposed Scheme and obtain relevant baseline information, discuss transport survey requirements and assessment methodology relating to traffic and transport.	Improved understanding of local traffic flows, highways operations and future proposals, and informed the emerging design and assessment of the Proposed Scheme.

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Local Authority technical meetings	Warrington Borough Council	Meetings to discuss the air quality and sound, noise and vibration assessment including proposed mitigation.	Information used to improve understanding of baseline conditions and factors used to inform the Proposed Scheme design and assessment, including the proposed mitigation in the Lowton area and concerns regarding Lowton Junior and Infant School.
Local Authority technical meetings	Warrington Borough Council	Meeting to discuss construction and logistics proposals and mitigation opportunities within the Warrington Borough Council area.	Informed understanding of local baseline conditions and provided an opportunity to consider any mitigation that may be required, including the location of A580 East Lancashire Road main compound near Lowton.
Local Authority technical meetings	Warrington Borough Council	Meetings with technical leads to collate data and discuss the historic environment assessment.	Information on local conditions and factors used to refine the design of the Proposed Scheme and assessment.
Local Authority technical meetings	Warrington Borough Council	Meeting to discuss known and potential contaminated land, proposed assessment, and mitigation measures for land quality.	Identified local areas of land contamination, potential impacts, and proposed mitigation.
Local Authority technical meetings	Warrington Borough Council	Meetings with technical leads to collate data and discuss landscape and visual impacts, viewpoint locations and site walkovers.	Informed the identification of viewpoint locations to be assessed and reported within the ES, as well as the extent of the landscape and visual study area. Obtained information to improve understanding of baseline conditions.
Local Authority technical meetings	Warrington Borough Council	Meetings to provide information on the Proposed Scheme and obtain relevant baseline information, discuss transport survey requirements and assessment methodology relating to traffic and transport.	Improved understanding of local traffic flows, highways operations and future proposals and informed the emerging design and assessment of the Proposed Scheme.
Local Authority technical meetings	Warrington Borough Council	Meeting with technical leads to collate data and discuss the socio-economic environment assessment.	Informed understanding of local baseline conditions and the design and assessment of the Proposed Scheme.
Local Authority technical meetings	Warrington Borough Council	Meetings with the Lead Local Flood Authorities to provide information on the Proposed Scheme and obtain relevant baseline information related to water resources and flood risk.	Informed understanding of local infrastructure and baseline conditions, including flood risks, assessment, and proposed mitigation.

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meetings to discuss the air quality and sound, noise and vibration assessment including proposed mitigation.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required.
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meetings with technical leads to collate data and discuss the historic environment assessment.	Improved understanding of local baseline conditions and informed the design and assessment of the Proposed Scheme.
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meeting to discuss known and potential contaminated land, proposed assessment and mitigation measures for land quality.	Identified local areas of land contamination, potential impacts and proposed mitigation.
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meetings with technical leads to collate data and discuss landscape and visual impacts, viewpoint locations and site walkovers.	Informed the identification of viewpoint locations to be assessed and reported within the ES, as well as the extent of the landscape and visual study area. Obtained information to improve understanding of baseline conditions.
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meeting with technical leads to collate data and discuss the socio-economic environment assessment.	Informed understanding of local baseline conditions and the design and assessment of the Proposed Scheme.
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meetings to provide information on the Proposed Scheme and obtain relevant baseline information and discuss transport survey requirements and assessment methodology relating to traffic and transport.	Improved understanding of local traffic flows, highways operations and future proposals, and informed the emerging design and assessment of the Proposed Scheme.
Local Authority technical meetings	Wigan Metropolitan Borough Council	Meetings with the Lead Local Flood Authorities to provide information on the Proposed Scheme and obtain relevant baseline information related to water resources and flood risk.	Informed understanding of local infrastructure and baseline conditions, including flood risks, assessment, and proposed mitigation.
Local technical specialist group	Cheshire Archaeology Planning Advisory Service	Meetings with technical leads to collate data and discuss the historic environment assessment.	Improved understanding of local baseline conditions and informed the design and assessment of the Proposed Scheme.

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Local technical specialist group	Cheshire Wildlife Trust	Meetings to discuss the Proposed Scheme, provide an update on consultation activities and to understand key areas of concern relating to impacts on local wildlife sites.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required, including at Holcroft Moss SSSI, part of the Manchester Mosses SAC.
Local technical specialist group	Community Forest Trust	Meeting to discuss the Proposed Scheme and mitigation opportunities at Viridor Wood and Byrom Wood.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required, including an understanding of access requirements and to ensure appropriate provision for access has been considered as part of the emerging design.
Local technical specialist group	Greater Manchester Archaeological Advisory Service	Meeting with technical leads to collate data and discuss the historic environment assessment.	Improved understanding of local baseline conditions and informed the design and assessment of the Proposed Scheme.
Local technical specialist group	Greater Manchester Local Records Centre	Meeting to collate data and discuss the ecology and biodiversity assessment.	Informed understanding of local baseline conditions and the design and assessment of the Proposed Scheme.
Local technical specialist group	Lancashire Wildlife Trust	Meetings to discuss the Proposed Scheme, in particular Little Woolden Moss and Holcroft Moss, and public access recreational land provision at Byrom Woods/Lightshaw Lane, and to discuss long-term after-care and maintenance.	Information used to improve understanding of baseline conditions and provide an opportunity to consider any mitigation that may be required, including an understanding of access requirements and to ensure appropriate provision for access has been considered as part of the emerging design.
Utilities	Cadent Gas	Network provision of gas	Informed considerations relating to the utilities network and factors to be considered in the design and assessment of the Proposed Scheme, as well as mitigation requirements on Cadent Gas assets at several locations including B5207 Wilton Road realignment, A58 Lily Lane, and A573 Wigan Road realignment. Discussions were also held regarding the provision of gas supplies to satellite compounds at Slag Lane, A573 Wigan Road, B5207 Wilton Lane and A572 Newton Road as well as A580 East Lancashire Road main compound.
Utilities	EE Mobile Masts	Network provision of telecommunications services	Identified telecommunication services and informed understanding of potential impacts of the Proposed Scheme and mitigation requirements on EE mobile mast assets at Glaziers Lane and New Hall Lane.
Utilities	Electricity North West Limited (ENWL)	Network provision of electricity	Informed considerations relating to the utilities network and factors to be considered in the design and assessment of the Proposed Scheme, as well

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
			as mitigation requirements. This included existing ENWL assets at A580 East Lancashire Road, New Hall Lane, A574 Warrington Road and B5207 Kenyon Lane. Discussions were also held around provision of electricity supplies to satellite compounds at Bamfurlong, Slag Lane, A573 Wigan Road, B5207 Wilton Lane and A572 Newton Road as well as A580 East Lancashire Road main compound.
Utilities	Instalcom	Network provision of telecommunications services	Identified telecommunication services and informed understanding of potential impacts of the Proposed Scheme and mitigation requirements on Instalcom assets close to Slag Lane viaduct.
Utilities	National Grid Transmission (Gas)	Network provision of gas	Informed considerations relating to the utilities network and factors to be considered in the design and assessment of the Proposed Scheme, as well as mitigation requirements. This included assets at A580 East Lancashire Road, A572 Newton Road and Lily Lane. Discussions were also held regarding the provision of gas supplies to A580 East Lancashire Road main and satellite compounds and A572 Newton Road satellite compound and the diversion of assets at Lightshaw Lane.
Utilities	Openreach	Network provision of telecommunications services	Identified telecommunication services and informed understanding of potential impacts of the Proposed Scheme and mitigation requirements on Openreach assets at several locations including A574 Newton Road, Glaziers Lane, Wigshaw Lane, Slag Lane, A580 East Lancashire Road and B5207 Wilton Road. Discussions were also held regarding provision of telecommunications facilities to satellite compounds at Slag Lane, A573 Wigan Road, B5207 Wilton Lane and A572 Newton Road as well as A580 East Lancashire Road main compound.
Utilities	United Utilities	Network provision of drinking water and wastewater services	Informed considerations relating to the utilities network and factors to be considered in the design and assessment of the Proposed Scheme, as well as mitigation requirements. This included the provision of potable water and sewerage services to satellite compounds at A573 Wigan Road, B5207 Wilton Lane, Bamfurlong and A572 Newton Road as well as A580 East Lancashire Road main compound. Discussions also held regarding the proposed diversion of assets and mitigation requirements at locations including A580 Lily Lane, A572 Newton Road, A580 East Lancashire Road, A574 Warrington Road and especially the existing water main at Slag Lane and the existing water main close to A580 East Lancashire Road satellite compound.

Type	Stakeholder	Area of focus	How this has informed the design and assessment of the Proposed Scheme
Utilities	Virgin Media	Network provision of telecommunications services	Identified telecommunication services and informed understanding of potential impacts of the Proposed Scheme and mitigation requirements on Virgin Media assets at A572 Newton Road and A580 East Lancashire Road.
Utilities	Vodafone Ltd (Below Ground Assets)	Network provision of telecommunications services	Identified telecommunication services and informed understanding of potential impacts of the Proposed Scheme and mitigation requirements on Vodafone mobile masts at Lowton St. Mary's.

3.3.16 HS2 Ltd has pursued engagement with all affected utility and technical stakeholders across the Proposed Scheme. Where possible HS2 Ltd has obtained information and designs from these stakeholders to inform and promote the collaborative development of the scheme.

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

Directly affected individuals, farmers and growers

3.3.18 This group includes those with land and property potentially affected by the Proposed Scheme, including individuals, farmers and growers within the Risley to Bamfurlong area.

3.3.19 As part of information events held in October 2018, June 2019, between October and November 2020 and between June and July 2021 (including using online channels where necessary), targeted engagement was also offered to those stakeholders who have land or property directly affected by the construction and operation of the Proposed Scheme. These appointments provided an opportunity to meet with technical experts, to gain a better understanding of the emerging design and share their thoughts on how this might affect them. Whilst these opportunities did not replace their right to respond formally to consultation, their feedback has also been considered during design development.

3.3.20 Information events provided affected individuals, farmers and growers with the opportunity to gain an understanding of compensation and assistance available for property owners. Facilities were available at the events to have private meetings with HS2 Ltd staff.

3.3.21 In addition, engagement has been offered via letter and through known land agents to all farmers and growers directly affected by the Proposed Scheme whether permanently or temporarily. Where offers have been accepted and it has been possible, visits have been made to the land and property affected although some interviews have needed to be undertaken virtually. The purpose of this engagement has been to obtain baseline information and provide the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. Information gathered from farm interviews has informed the assessment presented in this ES. Key issues raised through this engagement include likely long-term viability of the farm holdings, holding severance, access to severed land parcels, impacts on land drainage and additional land requirements for ecological, landscape and other mitigation.

3.3.22 Engagement with directly affected individuals and growers will continue as the project develops and opportunities for engagement with farmers and growers will continue to be offered throughout the parliamentary process.

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

Major asset owners and businesses

3.3.24 This group includes those with property potentially affected by the Proposed Scheme, including major asset holders and businesses within the Risley to Bamfurlong area.

3.3.25 As part of the information events held in October 2018, June 2019, between October and November 2020 and between June and July 2021 (including using online channels where necessary), targeted engagement was also offered to those stakeholders who have land, property or business operations directly affected by the construction and operation of the Proposed Scheme. These appointments provided an opportunity for these stakeholders to meet with technical experts, to gain a better understanding of the emerging design and share their thoughts on how this might affect them. Whilst these opportunities did not replace their right to respond formally to consultation, their feedback has also been considered during design development.

3.3.26 Engagement has been undertaken with major asset owners and businesses within the Risley to Bamfurlong area including Bancroft Boarding Kennels, BIFFA/UK Waste Management Ltd, Cheshire Commercials Ltd, Commhoist, CPM Properties, Culcheth Equestrian Centre, Damhead Investments Ltd/Lightoaks Investments Ltd, East Lancs Motor Company, Extra Motorway Services, Fontaine Europe Ltd, Folico Ltd, Jordan Timber, Lowton Business Park (Automation House), Lowton Riding Centre, Partridge Lakes Fishery, Prospect Housing (Bamfurlong Hall), PF Jones (Hansons Aggregates) and Taylor Business Park. The purpose of this engagement has been to obtain baseline information and provide these stakeholders with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme.

3.3.27 Key issues raised during this engagement have included:

- land requirements and impacts on access, property and business viability during both the construction and operational phases of the Proposed Scheme; and
- highways and traffic impacts, including those associated with proposed changes to Wigshaw Lane, A574 Warrington Road and A572 Newton Road, during both the construction and operational phases of the Proposed Scheme.

3.3.28 Engagement with these stakeholders will continue as the project 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 Risley to Bamfurlong area. Consideration is given to the extent and quality of the soil and land resources underpinning the primary land use activities of farming and forestry, and the physical and operational characteristics of enterprises engaged in these activities. Consideration is also given to diversification associated with the primary land uses, and to related land-based enterprises, notably equestrian activities.

4.1.2 Engagement with farmers and landowners has been undertaken. The purpose of the engagement has been to obtain baseline information on the scale and nature of the farm and forestry operations and related farm-based uses, and to provide farmers and landowners with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. Engagement undertaken with farmers and landowners will be documented in the farm pack for each farm holding as set out within a Phase 2b Farmers and Growers Guide[13].

4.1.3 Details of published and publicly available information used in the assessment, and the results of surveys undertaken within this area, are contained in Volume 5: Appendix AG-001-0MA05 and shown on Map Series AG-01 (Agricultural Holdings), AG-02 (Soil Associations) and AG-04 (Agricultural Land Classification) (Volume 5, Agriculture, forestry and soils Map Book).

4.1.4 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2, MA05 Map Book. The Proposed Scheme is described in Section 2.

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 Section 8 of Volume 1 and the EIA Scope and Methodology Report (SMR)[14].

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

[13] 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.

[14] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

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) system, which classifies agricultural land into five grades from excellent quality Grade 1 land to very poor quality Grade 5 land. Grade 3 is subdivided into Subgrades 3a and 3b. The main issue in the assessment of the impacts on agricultural land is the extent to which land of 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 and fuel. The impacts on this feature are 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, include flood water attenuation, carbon storage or the support of ecological habitats. This section describes these functions and assesses the ability of the soils to fulfil their primary functions after construction of the Proposed Scheme. 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. The function of soil as a carbon store is described in Volume 3 (Section 4, Climate change).

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 or 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 will 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. The details of land use have been obtained from face-to-face interviews wherever possible; elsewhere, information has been obtained from publicly available sources. Land use data have been collected since 2017 for the purposes of the assessment reported in this section.

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 Risley to Bamfurlong 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

Soil parent materials

4.3.2 A full description of the geological characteristics of the Risley to Bamfurlong area is provided in Volume 5: Appendix AG-001-0MA05, Section 10, Land quality and Section 15, Water resources and flood risk. This section only considers geology as a soil parent material, which is a soil-science name for a weathered rock or deposit from and within which a soil has formed[15]. The soil association developed in each parent material is identified below. Individual soil associations are described under 'Description and distribution of soil types' below.

4.3.3 Glacial till, comprising sandy silt clay with gravel, is widespread across the study area from Culcheth to beyond Golborne in the north. This parent material gives rise to soils in the Salop association.

4.3.4 Greyish till derived from Pennine Middle Coal Measures Formation (comprising coal seams, mudstone, siltstone and sandstone) is located in the northern extent of the study area. This parent material produces slowly permeable and seasonally waterlogged clay loam soils in the Brickfield 3 association.

4.3.5 Glaciofluvial sheet deposits, comprising sand and gravel, are present intermittently beneath the land required for the Proposed Scheme between the M62 and south of Culcheth. Where this parent material is seasonally waterlogged by a fluctuating groundwater table, it produces soils in the Blackwood association.

Topography and drainage

4.3.6 Topography in the southern region of the study area is broadly flat and rises in elevation from approximately 20m above Ordnance Datum (AOD) near the M62, to approximately 35m AOD to the south of Culcheth. This section of the study area includes Holcroft Moss, and has several peat workings, man-made lakes and ponds and the restored Risley Landfill. Between Culcheth and Golborne, the relief of the land is undulating. Topography ranges

[15] British Geological Survey (2011), *Soil Parent Material Model*. Available online at: https://www.bgs.ac.uk/datasets/soil-parent-material-model/.

between 35m AOD and 40m AOD, with gentle slopes of gradients of approximately two to three degrees. The land comprises fields which are enclosed by hedgerows and dotted with small ponds. Similar topography and elevation continue north of Golborne to the northern end of the area. There are no slopes within the study area with an angle exceeding seven degrees.

4.3.7 Flood risk is potentially limiting to agricultural land quality within the study area in the floodplain of Holcroft Lane Brook and along a tributary of Hey Brook. Other floodplains within the area that will be crossed by the route of the Proposed Scheme include those associated with Carr Brook, Small Brook, Windy Bank Brook, Nan Holes Brook and Coffin Lane Brook. There are substantial areas of floodplain in Flood Zone 2, in which there is between a 1 in a 100 and a 1 in 1,000 annual probability of river flooding, and flood Zone 3, in which there is a 1 in 100 or greater annual probability of river flooding. 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 present in the study area are described by the Soil Survey of England and Wales[16] and their general distribution is shown on the National Soil Map[17] which is replicated in Volume 5, Agriculture, forestry and soils (Map AG-02-105 Soil Associations). The soils are grouped into soil associations of a range of soil types that are spatially related. They are described in more detail in Volume 5: Appendix AG-001-0MA05.

4.3.9 The Wetness Class (WC) of a soil is classified according to the depth and duration of waterlogging in the soil profile. There are six categories: from WC I, which is well drained, to WC VI which is permanently wet.

4.3.10 The soil association data have been supplemented by detailed soil surveys on all land where access has been granted. These surveys assist with ALC and the planning of soil handling and restoration. The detailed surveys and existing survey records have identified four soil associations within this study area.

4.3.11 The most prevalent group comprises slowly permeable and seasonally waterlogged clay loams over clay soils (WC III to IV) of the Salop association. These soils are developed in reddish glacial deposits.

4.3.12 The next most prevalent group comprises deep, earthy peat soils of the Turbary Moor association. If these soils are improved for arable crops, usually by pumped ditches combined with field drains, they are well drained (WC I). Wetness class will vary depending on the level of the water-table and duration of waterlogging during the winter months. These peat soils hold large amounts of water available for crops.

[16] 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.

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

4.3.13 Of limited extent, are deep, permeable sandy and sandy loam soils which belong to the Blackwood association which are found in a localised area to the south of Culcheth. These soils are developed in glacial river deposits, which are variable in stone content and frequently overlie clay deposited in glacial lakes, or glacial till, at depth. Where undrained, the Blackwood soils are waterlogged for long periods during the winter (WC III and IV). These soils experience fluctuating levels of groundwater. Where the water-table has been lowered, the soils are well drained (WC I) or only slightly seasonally waterlogged (WC II).

4.3.14 The least common group comprises loamy and clayey soils in the Brickfield 3 association in the far north of the study area. These surface-water gley soils are waterlogged for long periods during the winter (WC IV). Much of this association is under permanent grass for livestock and dairying.

4.3.15 The sensitivity of the soils disturbed during construction activity is reflected by their textural characteristics, in the light of local Field Capacity Days (FCD), as set out in the SMR. FCD is a meteorological parameter which indicates an estimated 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. In areas of the highest number of FCD, 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 reinstatement of land; whereas soils with a high sand fraction in areas with the fewest FCD and during the driest times of the year are the least susceptible.

4.3.16 The soils in this study area are predominantly of medium sensitivity due to their clay content/medium textured soils where FCD are between 207 days – 217 days. Soils of this sensitivity category make up approximately 203ha or 80% of the agricultural land in the study area.

4.3.17 Peaty, clayey and seasonally waterlogged soils (including the Turbary Moor, Salop, and Brickfield 3 associations) are widespread over 243ha (95%) of the study area. These soils are of high due to peat or high silt fractions/heavy textured soils where FCD are between 207 days and 217 days per annum.

Soil and land use interactions

Agricultural land quality

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

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

4.3.20 Local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset[18] for three points within the study area and are set out in Volume 5: Appendix AG-001-0MA05. The data show climate in the area to be cool and moist. The number of FCD, when the moisture deficit is zero, ranges from 207 days – 217 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 vulnerability of soils to drought, are moderate to moderately small.

4.3.21 Average annual rainfall and accumulated temperature within this area do not in themselves place any limitation on agricultural land quality. However, the interactions of climate with soil characteristics are important in determining the wetness and droughtiness limitations of the land. Droughtiness is 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.

4.3.22 Site factors such as gradient and microrelief are not limiting to agricultural land quality within this study area. 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.

4.3.23 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness, soil droughtiness and a localised susceptibility to erosion. For soil wetness, each soil can be allocated a WC based on soil structure, evidence of waterlogging and the number of FCD. The topsoil texture then determines its ALC grade. Vulnerability to drought is determined by the moisture retention of different soil textures and thicknesses of each soil horizon, soil structures, stone content and moisture deficits.

4.3.24 The most prevalent group of soil associations, comprising clay loam over clay soils in the Salop association are slowly permeable and seasonally waterlogged for long periods during the winter (WC IV). In a climate area with between 207 to 217 FCDs, soil profiles with heavy clay loam topsoil are limited by soil wetness to Grade 4. Where the topsoil is medium clay loam, the soil profiles are limited to Subgrade 3b. Salop soil profiles in WC III are limited by soil wetness to Subgrade 3b where the topsoil is heavy clay loam, and to Subgrade 3a where the topsoil is medium clay loam. Survey data confirm Salop soils near Culcheth are mainly Subgrade 3b.

4.3.25 The next most prevalent group comprising deep earthy peat soil of the Turbary Moor association (WC I) is classified as Grade 1 where the topsoil is peat, or Grade 2 where the topsoil is organic medium clay loam. The peaty soils are limited by soil wetness to Grade 2 (WC III), or Subgrade 3a (WC IV). Survey data confirm that Turbary Moor soils south-west of Gorse Covert are a mixture of Grade 1 and Grade 2.

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

4.3.26 The next prevalent group comprising sandy soil profiles in the Blackwood association in the south of the study area are affected by a high water-table (WC III-IV). The quality of agricultural land is limited by soil wetness to Subgrade 3a where the profile is seasonally waterlogged (WC III), or Subgrade 3b where the profile is waterlogged for long periods during the winter (WC IV). Survey data confirm that Blackwood soils south-east of Gorse Covert are Subgrade 3a.

4.3.27 The least prevalent group comprises loamy and clayey soils in the Brickfield 3 association which are waterlogged for long periods during the winter (WC IV). The quality of agricultural land is limited by soil wetness to Subgrade 3b where the topsoil is medium clay loam, and Grade 4 where the topsoil is heavy clay loam or clay.

4.3.28 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 locality, set as a 4km corridor centred on the route of the Proposed Scheme. Department for the Environment, Food and Rural Affairs (Defra) predictive mapping[19] 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.

4.3.29 The distribution of agricultural land quality in the study area is shown in Table 7, described in more detail in Volume 5: Appendix AG-001-0MA05 and shown on Map AG-04-314b to Map AG-04-318-C1 (Volume 5, Agriculture, forestry and soils Map Book).

Table 7: Distribution of grades of agricultural land in the study area

Agricultural land quality	Area within study area (ha)	Percentage of agricultural land area within study area (%)
Grade 1	35.6	14.0
Grade 2	2.8	1.1
Subgrade 3a	47.2	18.6
BMV subtotal	**85.6**	**33.7**
Subgrade 3b	153.1	60.2
Grade 4	15.4	6.1
Grade 5	0	0
Total agricultural land	**254.1**	**100**

Other soil interactions

4.3.30 Soil fulfils a number of functions and services for society, in addition to those of food and biomass production, that are central to social, economic and environmental sustainability. These are outlined in sources such as the Soil Strategy for England[20] and the Government's

[19] Department for Environment, Food and Rural Affairs (2005), *Likelihood of Best and Most Versatile Agricultural Land* (1:250,000).

[20] Department for Environment, Food and Rural Affairs (2009), *Soil Strategy for England.* Available online at: https://www.gov.uk/government/publications/safeguarding-our-soils-a-strategy-for-england.

White Paper, The Natural Choice: securing the value of nature[21] and reinforced in the policies set out in the 25 year Environment Plan[22], and include:

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

4.3.31 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.

4.3.32 The floodplains of the Nan Holes Brook in the northern end of the study area occupy land where water flows or is 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

4.3.33 Agricultural land use in this study area is predominantly arable, particularly in the south, although some dairy and beef farms are also present. Around Glazebrook, Culcheth and Lowton some smaller equestrian holdings are also found.

4.3.34 Woodland is sparse and limited to small parcels across the study area. A number of environmental designations influence land use within the study area. The whole of the study area lies within a Nitrate Vulnerable Zone, where statutory land management measures apply limiting the average amount of nitrogen from manufactured fertiliser and organic manures that can be applied to agricultural land in order to reduce nitrogen losses from agricultural sources to the natural water environment. A full description of all woodland habitats in the Risley to Bamfurlong area is set out in Section 7, Ecology and biodiversity.

4.3.35 Although land owned by the Forestry Commission that will be affected by the construction of the Proposed Scheme has been identified, this land is presently being managed for its access potential rather than its timber; it has only relatively recently been planted with trees.

4.3.36 Some agricultural land is also subject to historical agri-environment management prescriptions that seek to retain and enhance the landscape and biodiversity qualities and features of farmland. These were associated with the Environmental Stewardship Scheme

[21] HM Government (2011), *The Natural Choice: securing the value of nature.*

[22] Department for Environment, Food and Rural Affairs (2018), *A Green Future: Our 25 Year Plan to Improve the Environment.* Available online at: https://www.gov.uk/government/publications/25-year-environment-plan.

(the Entry Level Stewardship (ELS), the Organic Entry Level Stewardship (OELS) or the Higher Level Stewardship (HLS)). The Countryside Stewardship Scheme (CSS) has been the main agri-environment scheme in England since 2015. The CSS incorporates elements of the Environmental Stewardship Scheme, the English Woodlands Grant Scheme and Catchment Sensitive Farming grants. Holdings that have land entered into an agri-environment scheme are identified in Table 8. These schemes are under review following the introduction of the Agriculture Act 2020[23].

Number, type and size of holdings

4.3.37 Table 8 sets out the main farm holdings within this study area. The details of holdings have been obtained from interviews with farm owners and occupiers. The interviews undertaken account for holdings which collectively cover approximately 86% of the total study area. Publicly available sources have been used to obtain information about farm holdings where it has not been possible to arrange interviews.

4.3.38 Arable farming predominates in the south and centre of the Risley to Bamfurlong area, with smaller, more marginal, urban fringe being prevalent around Lowton and Golborne. Average holding size is approximately 60ha. Equestrian use is also prevalent with nine holdings identified as having livery or riding school opportunities provided. The boundaries of the holdings are shown on maps AG-01-314b to AG-01-318-C1 (Volume 5, Agriculture, forestry and soils Map Book) along with the location of the main farm buildings. Field drainage is widely used throughout the study area.

4.3.39 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. The holding reference provides a unique identifier and relates to maps AG-01-314b to AG-01-318-C1 (Volume 5, Agriculture, forestry and soils Map Book) and Volume 5: Appendix AG-001-0MA05.

[23] *Agriculture Act 2020*. London, Her Majesty's Stationery Office. Available online at: https://www.legislation.gov.uk/ukpga/2020/21/contents/enacted.

Table 8: Summary characteristics of holdings

Holding reference/name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
MA05/1 Franks Farm	Arable	188	Homeopathy treatments provided	ELS	Medium
MA05/2 Land west of Franks Farm*	Arable	13	Not known	None	Medium
MA05/3 Ratcliffe House Farm	Arable and beef cattle	50	Livery stables	None	Medium
MA05/4 New Hall Farm	Arable and beef cattle	21	None	None	Medium
MA05/5 Bates Farm	Arable, beef cattle and sheep	79	None	None	Medium
MA05/6 New Hey Farm	Beef cattle	130	None	None	Medium
MA05/7 Yew Tree Farm	Grassland	1.0	None	None	Low
MA05/8 Glaziers Lane Farm	Arable	23	Residential properties let out	None	Medium
MA05/9 Phillips Farm	Arable and fishery	27	Retail outlet in converted buildings	None	Medium
MA05/10 Blakeley Farm	Arable and grassland	15	None	None	Low
MA05/11 Hill Top Farm	Equestrian (commercial)	26	Livery stables	None	Medium
MA05/12 Broseley Hall Farm	Equestrian (commercial)	57	Livery stables	None	Medium
MA05/13 Johnsons Farm	Organic dairy	59	None	CSS middle-tier	High
MA05/14 Clough Farm*	Equestrian (commercial)	10	None	None	Medium
MA05/15 White's Farm	Equestrian (commercial)	15	Livery stables and a skip hire business	None	Medium
MA05/16 Carr Farm	Arable	30	None	None	Medium
MA05/17 Birchalls Farm	Arable and beef cattle	100	None	None	Medium
MA05/18 Cheetham Fold Stables*	Equestrian (commercial)	13	Livery stables	None	Medium

Holding reference/name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
MA05/19 Warren Croft Farm	Equestrian (commercial)	4.0	Livery stables	None	Medium
MA05/20 Red House Farm	Beef cattle	13	None	None	Medium
MA05/21 Land at Slag Lane	Grassland	4.0	None	None	Low
MA05/22 Bancroft Kennels	Dog kennels	2.1	None	None	Low
MA05/23 Laburnum Farm	Grassland and kennels	5.0	None	None	Low
MA05/24 Lowton Riding Centre	Equestrian (commercial)	6.0	Riding school	None	Medium
MA05/25 72 Slag Lane	Equestrian (commercial)	26	Phone mast	None	Medium
MA05/26 Land north of 72 Slag Lane*	Grassland	5.0	Not known	None	Low
MA05/27 Land at Byrom Hall*	Grassland	5.0	Not known	None	Low
MA05/28 Forestry Commission Land at Golborne*	Forestry and access land	35	Not known	None	Low
MA05/29 Windy Bank Farm	Arable and grassland	36	None	None	Medium
MA05/30 Land at Lowton*	Arable and grassland	4.0	Not known	None	Low
MA05/31 Lightshaw Hall Farm	Arable and grassland	23	None	None	Medium
MA05/32 Wigan Road Farm	Arable and beef cattle	22	None	None	Medium
MA05/33 Sewerage Farm*	Arable and grassland	42	Not known	None	Medium
MA05/34 Diggle Green Farm*	Arable and grassland	45	Not known	None	Medium
MA05/35 Balmer's Farm*	Grassland	32	Not known	None	Medium
MA05/36 Aye Bridge Farm	Grassland and beef cattle	40	None	None	Medium
MA05/37 Locker Lane Farm	Arable and grassland	57	None	None	Medium

Holding reference/name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
MA05/38 Bryn Hall Farm and Landgate Farm	Arable and grassland	1,122	Green waste composting company, commercial shoot	CSS middle-tier	Medium

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

Future baseline

Construction (2025)

4.3.40 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. No committed developments have been identified in this study area that will materially alter the baseline conditions in 2025 for agriculture, forestry and soils.

Operation (2038)

4.3.41 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No committed developments have been identified in this study area that will materially alter the baseline conditions in 2038 for agriculture, forestry and soils.

4.4 Effects arising during construction

Avoidance and mitigation measures

4.4.1 During the development of the design, the following measures have been incorporated to avoid or mitigate adverse severance impacts on land holdings:

- provision of the Risley East accommodation underbridge to mitigate severance at Franks Farm (MA05/1), (Volume 2: MA05 Map Book, map CT-06-327);
- provision of the Footpath Croft 13 accommodation underbridge to mitigate severance at Ratcliffe Hall Farm (MA05/3), (Volume 2: MA05 Map Book, map CT-06-327);
- provision of the Footpath Golborne 33/10 accommodation underbridge to mitigate severance at the Forestry Commission land at Golborne (MA05/28), (Volume 2: MA05 Map Book, map CT-06-331); and
- provision of the Footpath Ashton-in-Makerfield 22/30 accommodation underbridge to mitigate severance at Locker Lane Farm (MA05/37), (Volume 2: MA05 Map Book, map CT-06-333).

4.4.2 Other design refinements to limit the impact of the Proposed Scheme on agriculture, forestry and soil resources include:

- rationalisation of balancing ponds to seek to locate them in the least sensitive agricultural locations;
- locally slackened slopes to improve agricultural land use or steepened slopes to limit the area of agricultural land required;
- rationalisation of road realignments to limit the area of agricultural land required;
- incorporation of agricultural tracks to gain access to severed land; and
- rationalisation and relocation of mitigation planting to limit the area of agricultural land required and reduce impacts on holdings.

4.4.3 In addition, there is a need to avoid or reduce environmental impacts to soils during construction so that they will be in a suitable condition to support their proposed use for agricultural land, landscape planting and ecological mitigation following construction.

4.4.4 Compliance with the Code of Construction Practice (CoCP) will avoid or reduce environmental impacts during construction. Those measures that are particularly relevant to agriculture, forestry and soils are set out in the draft CoCP[24] 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 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 will include any remediation measures necessary following the completion of works (Section 6);
- a requirement for contractors to monitor and manage flood risk and other extreme weather events, insofar as reasonably practicable, that may affect agriculture, forestry and soil resources during construction (Sections 5 and 16);
- arrangements for the maintenance of farm and field accesses affected by construction (Section 6);
- the protection and maintenance of existing land drainage and livestock water supply systems, where reasonably practicable (Sections 6 and 16);
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing (Sections 5, 6, 9 and 12);
- the adoption of measures to control the deposition of dust on adjacent agricultural crops (Section 7);
- the control of invasive and non-native species; and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land (Section 9);

[24] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

- special provisions for handling peat and peaty soils, where the disturbance of these soils cannot be avoided (Section 6);
- the adoption of measures to prevent, as far 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).

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

4.4.6 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 Salop association soils) may also require particularly careful management, such as the timing of cultivation and livestock grazing, during the aftercare period to meet this design objective.

Assessment of impacts and effects

4.4.7 The acquisition and use of land for the Proposed Scheme will 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 will 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;
- highway, PRoW or utility diversion/realignment;
- returned to agricultural use (with aftercare management to ensure effective field drainage and 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 During the construction phase, the total area of agricultural land used within the Risley to Bamfurlong area will be approximately 254ha as shown in Table 9. Of this total, it is anticipated that approximately 89ha will be restored and available for agricultural use following construction.

Table 9: Agricultural land required for the construction of the Proposed Scheme

Agricultural land quality	Area required (ha)	Percentage of agricultural land (%)	Area to be restored (ha)
Grade 1	35.6	14.0	16.0
Grade 2	2.8	1.1	2.8
Subgrade 3a	47.2	18.6	19.1
BMV subtotal	**85.6**	**33.7**	**37.9**
Subgrade 3b	153.1	60.2	47.0
Grade 4	15.4	6.1	4.3
Grade 5	0.0	0.0	0.0
Total agricultural land	**254.1**	**100**	**89.2**

4.4.10 The disturbance during construction to approximately 86ha of BMV land is assessed as an impact of medium magnitude, comprising approximately 34% of the agricultural land requirement. BMV land is assessed as a receptor of medium sensitivity because of its abundance in this locality. The effect of the Proposed Scheme on BMV land during the construction phase is, therefore, assessed as moderate adverse, which is significant.

4.4.11 Following completion of construction, temporary facilities will 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. This could improve the quality of agricultural land locally, for example where droughty soils are limited by soil depth, subject to the soil resource plans to be prepared during the detailed design stage.

Impacts on soils

4.4.12 In areas of heaviest rainfall, 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 of lowest rainfall 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 Soils[25]. These principles will be followed throughout the construction period.

4.4.14 Implementation of the measures set out in the draft CoCP will ensure displaced soil from the Proposed Scheme will mostly fulfil its pre-existing functions on-site, which are the production of food, water stores for flood attenuation and providing ecological habitat on-site. This results in an impact of low magnitude on the displaced soils. The sensitivity of the majority of soil in the study area is medium, and therefore, the significance of the effect will be minor adverse, which is not significant.

4.4.15 Turbary Moor associations are least able to remain structurally stable if moved in wet conditions or by inappropriate equipment. These soils are of high sensitivity, susceptible to compaction and smearing which could affect successful reinstatement. These soils are found in the south of the area covering a total area of approximately 17ha (5%) within the study area, which is an impact of low magnitude. The sensitivity of these soils is high, and therefore, the significance of the effect will be moderate adverse, which is significant.

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

Impacts on forestry land

4.4.17 Although land owned by the Forestry Commission will be affected (MA05/28), it is presently managed as open access land for the public and has limited tree planting. As such, it is not considered that any areas of commercial forestry land will be required for the Proposed Scheme in this study area.

Impacts on holdings

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

4.4.19 The effects of the Proposed Scheme on individual agricultural and related interests during the construction period are summarised in Table 10. The table shows the total area of land

[25] Department for Environment, Food and Rural Affairs (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.* Available online at: https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites.

required from a particular holding in absolute terms and as a percentage of the total area farmed. It also shows the area of land that could be returned to the holding following the construction period. The degree of impact is based on the proportion of the holding required rather than the absolute area of land.

4.4.20 The effects of severance during construction are judged on the ease and availability of access to severed land. The disruptive effects, principally of construction noise and dust, are assessed according to their effects on land uses and enterprises. Impacts on residential properties on farm holdings are assessed, as required, in Section 5, Air quality; Section 6, Community; and Section 13, Sound, noise and vibration. Full details of the nature and significance of effects are set out in Volume 5: Appendix AG-001-0MA05.

4.4.21 Southwall Hall Farm (MA04/15) has land in both the Broomedge to Glazebrook area (MA04) and the Risley to Bamfurlong area. The impacts and effects on this holding are assessed and reported in the Pickmere to Agden and Hulseheath area report as the main farm buildings are in that area.

4.4.22 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 temporary impacts and effects on holdings from construction

Holding reference/ name	Sensitivity to change	Total area required from holding	Construction severance	Disruption	Scale of construction effect	Area to be restored
MA05/1 Franks Farm	Medium	32.5ha (17%) Medium	Low	Negligible	Moderate adverse due to the proportion of land required.	14.9ha
MA05/2 Land west of Franks Farm	Medium	6.6ha (51%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.	2.4ha
MA05/3 Ratcliffe House Farm	Medium	10ha (>20%) High	Negligible	Low	Major/moderate adverse due to the proportion of land required.	3.4ha
MA05/4 New Hall Farm	Medium	12ha (57%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.	5.6ha
MA05/5 Bates Farm	Medium	23.5ha (30%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.	4.4ha
MA05/6 New Hey Farm	Medium	3.8ha (3%) Negligible	High	Negligible	Major/moderate adverse due to severance.	0.6ha

Holding reference/ name	Sensitivity to change	Total area required from holding	Construction severance	Disruption	Scale of construction effect	Area to be restored
MA05/7 Yew Tree Farm	Low	<0.1ha (<1%) Negligible	Negligible	Negligible	Negligible	<0.1ha
MA05/8 Glaziers Lane Farm	Medium	10.9ha (47%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.	1.9ha
MA05/9 Phillips Farm	Medium	5.1ha (19%) Medium	Low	Low	Moderate adverse due to the proportion of land required.	2.2ha
MA05/10 Blakeley Farm	Low	4.8ha (32%) High	Negligible	Negligible	Moderate adverse due to the proportion of land required.	0.7ha
MA05/11 Hill Top Farm	Medium	2.3ha (9%) Low	Negligible	Low	Minor adverse	0.2ha
MA05/12 Broseley Hall Farm	Medium	5.5ha (10%) Low	Negligible	Low	Minor adverse	1.3ha
MA05/13 Johnsons Farm	High	2.9ha (5%) Negligible	Negligible	Negligible	Minor adverse	0.4ha
MA05/14 Clough Farm	Medium	0.5ha (5%) Negligible	Negligible	Low	Minor adverse	0.2ha
MA05/15 White's Farm	Medium	7.1ha (47%) High	Negligible	Low	Major/moderate adverse due to the proportion of land required.	2.5ha
MA05/16 Carr Farm	Medium	12.6ha (42%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.	6.5ha
MA05/17 Birchalls Farm	Medium	22.8ha (23%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.	12.2ha
MA05/18 Cheetham Fold Stables	Medium	9ha (69%) High	Negligible	Medium	Major/moderate adverse due to the proportion of land required.	6.3ha
MA05/19 Warren Croft Farm	Medium	0.6ha (14%) Medium	Negligible	Medium	Moderate adverse due to the proportion of land required and disruption.	0.1ha

Holding reference/ name	Sensitivity to change	Total area required from holding	Construction severance	Disruption	Scale of construction effect	Area to be restored
MA05/20 Red House Farm	Medium	3.7ha (28%) High	High	Negligible	Major/moderate adverse due to the proportion of land required and severance.	1.3ha
MA05/21 Land at Slag Lane	Low	0.4ha (9%) Low	Negligible	Negligible	Negligible	0.1ha
MA05/22 Bancroft Kennels	Low	2.1ha (100%) High	Negligible	Negligible	Moderate adverse due to the proportion of land required.	0.1ha
MA05/23 Laburnum Farm	Low	1.7ha (35%) High	High	Negligible	Moderate adverse due to the proportion of land required and severance.	0.1ha
MA05/24 Lowton Riding Centre	Medium	0.1ha (2%) Negligible	Negligible	Medium	Moderate adverse due to disruption.	0.1ha
MA05/25 72 Slag Lane	Medium	10.8ha (41%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.	5.8ha
MA05/26 Land north of 72 Slag Lane	Low	4ha (80%) High	Negligible	Negligible	Moderate adverse due to the proportion of land required.	0ha
MA05/27 Land at Byrom Hall	Low	1.8ha (36%) High	Negligible	Negligible	Moderate adverse due to the proportion of land required.	1.7ha
MA05/28 Forestry Commission Land at Golborne	Low	13.4a (38%) High	Low	Low	Moderate adverse due to the proportion of land required.	4.4ha
MA05/29 Windy Bank Farm	Medium	33.1ha (92%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.	2.3ha
MA05/30 Land at Lowton	Low	0.4ha (11%) Medium	Negligible	Negligible	Minor adverse	0ha
MA05/31 Lightshaw Hall Farm	Medium	1.2ha (>5%) Low	Negligible	Negligible	Minor adverse	0.7ha

Holding reference/ name	Sensitivity to change	Total area required from holding	Construction severance	Disruption	Scale of construction effect	Area to be restored
MA05/32 Wigan Road Farm	Medium	2.7ha (12%) Medium	Medium	Negligible	Moderate adverse due to the proportion of land required and severance.	1.1ha
MA05/33 Sewerage Farm	Medium	4.9ha (12%) Medium	Negligible	Negligible	Moderate adverse due to the proportion of land required.	4.9ha
MA05/34 Diggle Green Farm	Medium	0.2ha (<1%) Negligible	Negligible	Negligible	Negligible	0.2ha
MA05/35 Balmer's Farm	Medium	18.2ha (57%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.	8.4ha
MA05/36 Aye Bridge Farm	Medium	18.4ha (46%) High	Medium	Low	Major/moderate adverse due to the proportion of land required.	7.1ha
MA05/37 Locker Lane Farm	Medium	4.3ha (8%) Low	Low	Negligible	Minor adverse	2.0ha
MA05/38 Bryn Hall Farm and Landgate Farm	Medium	0.2ha (<1%) Negligible	Negligible	Negligible	Negligible	0.2ha

4.4.23 Overall, 38 holdings in the Risley to Bamfurlong area will be affected during construction, of which 27 will experience moderate or moderate/major adverse effects, which are significant for each holding.

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

Permanent effects of construction

Impacts on agricultural land

4.4.25 Following construction and restoration, the area of agricultural land that will remain permanently required will be approximately 165ha, as shown in Table 11.

Table 11: Agricultural land required permanently

Agricultural land quality	Total area required (ha)	Percentage of agricultural land (%)
Grade 1	19.6	11.9
Grade 2	0.0	0.0
Subgrade 3a	28.1	17.0
BMV subtotal	**47.7**	**28.9**
Subgrade 3b	106.1	64.3
Grade 4	11.2	6.8
Grade 5	0.0	0.0
Total agricultural land	**165.0**	**100**

4.4.26 Of this total requirement, approximately 15.5ha (9%) will comprise newly planted woodland on agricultural land for visual screening and habitat creation to mitigate environmental effects arising from the Proposed Scheme. This mitigation is described in Section 7, Ecology and biodiversity and Section 11, Landscape and visual.

4.4.27 Replacement floodplain storage will occupy a total area of 2.3ha of agricultural land (see Volume 2: MA05 Map Book, maps CT-06-328, CT-06-331 and CT-06-333 (C5)). Some of this land is BMV land and could be subject to marginal downgrading in agricultural land quality. This agricultural assessment assumes that this land will be returned to agricultural use.

4.4.28 The permanent requirement for approximately 48ha of BMV land within the Risley to Bamfurlong area is assessed as an impact of medium magnitude, comprising 29% of the overall agricultural land requirement. BMV land is assessed as a receptor of medium sensitivity because of its relative abundance in this area. The permanent effect on BMV land is, therefore, assessed as moderate adverse, which is significant.

Impacts on holdings

4.4.29 The permanent effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 12. The land required column refers to the area of land required to operate the Proposed Scheme in absolute terms and as a percentage of the overall area farmed. The scale of impact is based on the likely proportion of land required from the holding. The 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 loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and enterprises. Full details of the nature and scale of effects are set out in Volume 5: Appendix AG-001-0MA05.

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

Table 12: Summary of permanent impacts and effects on holdings from construction

Holding reference/ name	Sensitivity to change	Land required from holding	Severance	Infrastructure	Scale of effect
MA05/1 Franks Farm	Medium	17.6ha (9%) Low	Low	Negligible	Minor adverse
MA05/2 Land west of Franks Farm	Medium	4.2ha (32%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/3 Ratcliffe House Farm	Medium	6.6ha (13%) Medium	Negligible	Negligible	Moderate adverse due to the proportion of land required.
MA05/4 New Hall Farm	Medium	6.4ha (31%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/5 Bates Farm	Medium	19.1ha (24%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/6 New Hey Farm	Medium	3.2ha (2%) Negligible	Negligible	Negligible	Negligible
MA05/7 Yew Tree Farm	Low	0ha (0%) Negligible	Negligible	Negligible	Negligible
MA05/8 Glaziers Lane Farm	Medium	9ha (39%) High	Negligible	High	Major/moderate adverse due to the proportion of land required and property demolition.
MA05/9 Phillips Farm	Medium	2.9ha (11%) Medium	Low	High	Major/moderate adverse due to property demolition.
MA05/10 Blakeley Farm	Low	4.1ha (27%) High	Negligible	Negligible	Moderate adverse due to the proportion of land required.
MA05/11 Hill Top Farm	Medium	2.1ha (8%) Low	Negligible	Negligible	Minor adverse
MA05/12 Broseley Hall Farm	Medium	4.2ha (7%) Low	Negligible	Negligible	Minor adverse
MA05/13 Johnsons Farm	High	2.5ha (4%) Negligible	Negligible	Negligible	Minor adverse
MA05/14 Clough Farm	Medium	0.3ha (3%) Negligible	Negligible	Negligible	Negligible

Holding reference/ name	Sensitivity to change	Land required from holding	Severance	Infrastructure	Scale of effect
MA05/15 White's Farm	Medium	4.6ha (31%) High	Negligible	High	Major/moderate adverse due to the proportion of land required and property demolition.
MA05/16 Carr Farm	Medium	6.1ha (>20%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/17 Birchalls Farm	Medium	10.6ha (11%) Medium	Medium	High	Major/moderate adverse due to property demolition.
MA05/18 Cheetham Fold Stables	Medium	2.7ha (21%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/19 Warren Croft Farm	Medium	0.5ha (13%) Medium	Negligible	Negligible	Moderate adverse due to the proportion of land required.
MA05/20 Red House Farm	Medium	2.4ha (18%) Medium	High	Negligible	Major/moderate adverse due to severance.
MA05/21 Land at Slag Lane	Low	0.3ha (7%) Low	Negligible	Negligible	Negligible
MA05/22 Bancroft Kennels	Low	2.0ha (96%) High	Negligible	High	Moderate adverse due to the proportion of land required and property demolition.
MA05/23 Laburnum Farm	Low	1.6ha (32%) High	High	High	Moderate adverse due to the proportion of land required, severance and property demolition.
MA05/24 Lowton Riding Centre	Medium	<0.1ha (<1%) Negligible	Negligible	Negligible	Negligible

Holding reference/ name	Sensitivity to change	Land required from holding	Severance	Infrastructure	Scale of effect
MA05/25 72 Slag Lane	Medium	5.0ha (19%) Medium	Medium	Negligible	Moderate adverse due to the proportion of land required and severance.
MA05/26 Land north of 72 Slag Lane	Low	4ha (80%) High	Negligible	Negligible	Moderate adverse due to the proportion of land required.
MA05/27 Land at Byrom Hall	Low	<0.1ha (<1%) Negligible	Negligible	Negligible	Negligible
MA05/28 Forestry Land at Golborne	Low	9ha (26%) High	Low	Negligible	Moderate adverse due to the proportion of land required.
MA05/29 Windy Bank Farm	Medium	30.8ha (86%) High	Negligible	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/30 Land at Lowton	Low	0.4ha (>10-%) Medium	Negligible	Negligible	Minor adverse
MA05/31 Lightshaw Hall Farm	Medium	0.5ha (2%) Negligible	Negligible	Negligible	Negligible
MA05/32 Wigan Road Farm	Medium	1.6ha (7%) Low	Medium	Negligible	Moderate adverse due to severance.
MA05/33 Sewerage Farm	Medium	0ha (0%) Negligible	Negligible	Negligible	Negligible
MA05/34 Diggle Green Farm	Medium	0ha (0%) Negligible	Negligible	Negligible	Negligible
MA05/35 Balmer's Farm	Medium	9.8ha (31%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/36 Aye Bridge Farm	Medium	11.3ha (28%) High	Medium	Negligible	Major/moderate adverse due to the proportion of land required.
MA05/37 Locker Lane Farm	Medium	2.3ha (4%) Negligible	Low	Negligible	Minor adverse

Holding reference/ name	Sensitivity to change	Land required from holding	Severance	Infrastructure	Scale of effect
MA05/38 Bryn Hall Farm and Landgate Farm	Medium	0ha (0%) Negligible	Negligible	Negligible	Negligible

4.4.31 Overall, the construction of the Proposed Scheme will affect 34 holdings in Risley to Bamfurlong area permanently, with 22 holdings experiencing moderate or major/moderate adverse permanent effects, which are significant for each holding. A further four holdings will only be affected temporarily during construction with negligible permanent effects remaining.

4.4.32 Six holdings will be affected by property demolition with all experiencing a significant adverse effect to the holding. The holdings affected are Glaziers Lane Farm (MA05/8), Phillips Farm (MA05/9), White's Farm (MA05/15), Birchalls Farm (MA05/17), Bancroft Kennels (MA05/22) and Laburnum Farm (MA05/23).

4.4.33 Cheetham Fold Stables (MA05/18) will experience major/moderate adverse effects due to the proportion of land required and it is likely that the holding will have to reorganise its facilities to continue to operate. In addition to land that is required for the construction of the Lowton south embankment, part of the land required is intended to be used for community sports pitches to offset another significant adverse effect of the Proposed Scheme and this issue is described further in Section 6, Community.

4.4.34 Although financial compensation will be available under existing statutory arrangements, there can be no certainty that this will 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

4.4.35 Other mitigation will incorporate climate change adaptation and resilience measures, as far 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.

4.4.36 A farm pack, as set out within the Phase 2b Farmers and Growers Guide, will be provided to all farmers and landowners, setting out baseline conditions on the land holding and the assurances and obligations that HS2 Ltd will accept upon entering the land. This will 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. In instances where replacement facilities need to be provided, HS2 Ltd will identify the likely impact on existing facilities and its timing, as soon as reasonably practicable.

Summary of likely residual significant effects

4.4.37 During construction, the total area of agricultural land required will be approximately 254ha, of which approximately 86ha is BMV land. This is assessed as a temporary moderate adverse effect, which is significant.

4.4.38 Thirty-eight holdings will be affected temporarily, of which 27 will experience temporary moderate or major/moderate adverse residual effects, which are significant for each holding.

4.4.39 Once construction is complete and land required temporarily has been restored, 165ha of agricultural land will continue to be required permanently, of which 48ha is BMV land. This is assessed as a permanent moderate adverse effect, which is significant.

4.4.40 Thirty-four holdings will be affected permanently, of which 22 will experience moderate or moderate/major permanent effects following construction, which is significant for each holding.

Cumulative effects

4.4.41 There are no cumulative effects identified as arising from the construction of the Proposed Scheme as a consequence of other development projects affecting agricultural land in the locality.

4.5 Effects arising from operation

Avoidance and mitigation measures

4.5.1 No measures are included 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 will include:

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

4.5.3 Farm livestock buildings at 72 Slag Lane (MA05/26, noise assessment reference: 618119), Balmer's Farm (MA05/35, noise assessment reference: 618081) and Aye Bridge Farm (MA05/36, noise assessment reference: 618120) all lie within approximately 100m of the route of the Proposed Scheme. Operational airborne sound levels at these locations have been included in the assessment and the results are presented in Volume 5: Appendix SV-003-0MA05.

4.5.4 The predicted operational airborne sound levels have been considered against the specific criteria defined in the Agriculture, forestry and soils section of the SMR. Taking into consideration the noise mitigation included within the Proposed Scheme, as shown on Map Series SV-02 (Volume 5, Sound, noise and vibration Map Book), no likely significant effects from noise on livestock are identified.

4.5.5 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.

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

Other mitigation measures

4.5.7 No other mitigation measures have been identified.

Summary of likely residual significant effects

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

Cumulative effects

4.5.9 There are no cumulative effects identified as arising from the operation of the Proposed Scheme as a consequence of other development projects affecting agriculture, forestry or soil in the study area.

Monitoring

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

4.5.11 On the basis of there being no significant residual operational effects, there are no area-specific requirements for monitoring agriculture, forestry and soil effects during the operation of the Proposed Scheme in the Risley to Bamfurlong 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 arising from the construction and operation of the Proposed Scheme within the Risley to Bamfurlong area. Oxides of nitrogen (NOx) including nitrogen dioxide (NO_2), fine particulate matter (particles of size less than 2.5µm and 10µm in diameter, referred to as $PM_{2.5}$ and PM_{10}, respectively) 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 will also arise from road traffic during construction and operation of the Proposed Scheme.

5.1.2 Engagement with Warrington Borough Council (WBC), St Helens Borough Council (SHBC) and Wigan Metropolitan Borough Council (WMBC) has been undertaken. The purpose of this engagement has been to obtain relevant baseline information, which includes monitoring data in this area.

5.1.3 Detailed reports on the air quality data and assessments for this area are contained within Volume 5: Appendix AQ-001-0MA05. Additional information on air quality monitoring and traffic data used in the assessment is set out in Background Information and Data (BID), BID AQ-002-0MA05[26].

5.1.4 Maps showing the location of the key environmental features and the key construction and operational features of the Proposed Scheme can be found in the Volume 2, MA05 Map Book. Air quality mapping is presented in the Volume 5, Air quality Map Book, map AQ-01-305.

5.1.5 The Proposed Scheme is described in Section 2.

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), the EIA Scope and Methodology Report (SMR)[27] and Volume 5: Appendix AQ-001-0MA05.

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

- from construction activities;

[26] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data, Air quality*, BID AQ-002-0MA05. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

[27] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

- 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; or
- from changes to road alignment.

5.2.3 The assessment of construction dust emissions has been undertaken for sensitive receptors located up to 350m from dust generating activities. The assessment of traffic emissions has been undertaken for sensitive receptors located up to 200m from roads screened in for further assessment.

5.2.4 The assessment has incorporated HS2 Ltd's policies on vehicle emissions[28]. These include the use of Euro VI heavy goods vehicles (HGV), Euro 4 petrol and Euro 6 diesel cars and light goods vehicles (LGV) during construction of the Proposed Scheme.

5.2.5 The assessment of construction traffic impacts has used traffic data based on an estimate of the average daily flows in the peak year during the construction period (2025-2037). Two construction scenarios have been assessed for air quality to capture peak construction traffic activity at different times in the construction period. It has been assumed that the changes in construction traffic will occur for the whole year. In some cases, this is a conservative approach, as the duration of the peak traffic flows may well be much shorter. These scenarios have been assessed against the relevant future baseline case without the Proposed Scheme. The assessment also assumes vehicle emission rates and background pollutant concentrations from the year 2025. Since 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 2025 represents the worst case for the construction assessment.

5.2.6 The predicted impacts across all assessed construction scenarios for each receptor are presented in Volume 5: Appendix AQ-001-0MA05. Predicted concentrations and significant effects are presented for the worst-case construction traffic scenario assessed.

5.3 Environmental baseline

Existing baseline

Background air quality

5.3.1 The main sources of air pollution in the Risley to Bamfurlong area are emissions from road vehicles and agricultural activities. The main roads within the area are the M6, the M62, the A574 Birchwood Way/Birchwood Park Avenue/Warrington Road, the A580 East Lancashire Road, the A572 Newton Road/Worsley Brow/Worsley Road/Leigh Road, the A573 Warrington Road/Aye Bridge Road/Wigan Road/Church Street/High Street/Bridge Street/Warrington Road, the A49 Warrington Road/Lodge Lane (also known locally as Roman Road)/Bryn Street,

[28] High Speed Two Ltd (2022), *Phase 2b Western Leg Information Paper E14: Air quality*.

the A579 Atherleigh Way, the A58 Liverpool Road/Gerard Street/Bolton Road/Lily Lane and the A575 Walkden Road.

5.3.2 There are seven industrial installations (regulated by the Environment Agency) with permits for emissions to air for NOx and/or PM_{10}, namely Greencore Prepared Meals Limited, Biffa Waste Services Limited (landfill), Electric Glass Fibre UK Limited, Chemviron Carbon Limited, Alkane Energy CM Limited, Karas Plating Limited and UK Power Reserve. Their details are presented in BID AQ-002-0MA05. The contribution of these industrial processes to local air quality is included within the background concentrations.

5.3.3 Estimates of background air quality have been taken from the Department for Environment, Food and Rural Affairs (Defra)[29] for the baseline year of 2018. The data are estimated for 1km grid squares for NOx, NO_2, PM_{10} and $PM_{2.5}$. Background concentrations were within the air quality standards for all pollutants within the Risley to Bamfurlong area.

Local monitoring data

5.3.4 There are currently 21 local authority diffusion tube sites located within the Risley to Bamfurlong area for monitoring NO_2 concentrations. These are located in St Helens, Warrington and Wigan.

5.3.5 There are also three continuous air quality monitoring sites within the Risley to Bamfurlong area. These are located in the centre of Wigan, on the A572 Southworth Road and on the A49 High Street in Newton-le-Willows. The Wigan Centre site measures NO_2, PM_{10} and $PM_{2.5}$ concentrations, whilst the sites on the A572 Southworth Road and the A49 High Street only measure NO_2 concentrations.

5.3.6 HS2 Ltd has undertaken additional monitoring for the purpose of verifying the air quality assessment at seven locations in this area.

5.3.7 Measurements of NO_2 were within the air quality standard at 28 locations in 2018. Annual mean NO_2 concentrations were above the air quality standard in 2018 at the diffusion tube in Ashton-in-Makerfield and Risley and at the A572 Southworth Road continuous monitor. Measurements of PM_{10} and $PM_{2.5}$ were within the air quality standard at the Wigan Centre site in 2018.

5.3.8 Details of the location of all monitoring sites are presented in Map AQ-01-0MA05 and the monitoring data are presented in Volume 5: Appendix AQ-001-0MA05 and BID AQ-002-0MA05.

Air quality management areas

5.3.9 There are four air quality management areas (AQMA) within the Risley to Bamfurlong area: the Warrington AQMA No. 1; Newton High Street AQMA (No.2); M6 AQMA No.1; and the

[29] Department for Environment, Food and Rural Affairs (2020), *Background Pollutant Concentration Maps*. Available online at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

Greater Manchester Combined Authority (GMCA) AQMA. All four AQMA were designated for exceedances of the annual mean NO_2 standard. The Warrington AQMA No.1 covers the M6, M62 and M56 corridors and was declared in November 2001. The Newton High Street AQMA (No.2) covers residential properties along the A49 High Street in Newton-le-Willows and was declared in April 2009. The M6 AQMA No.1 covers the area of the M6 through the SHBC administrative area and was declared in April 2009. The GMCA AQMA covers a number of areas of Greater Manchester and was declared in May 2016. Details of the location of the AQMA are presented in Map AQ-01-305 and Volume 5: Appendix AQ-001-0MA05.

Receptors

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

5.3.11 Most of the receptors which may be affected by the Proposed Scheme are residential.

5.3.12 The air quality assessment has also included receptors in ecological sites sensitive to nitrogen deposition and dust. There are four international/national ecological site designations of relevance to the air quality assessment identified in the Risley to Bamfurlong area, namely Manchester Mosses Special Area of Conservation (SAC), Holcroft Moss Site of Special Scientific Interest (SSSI) (which forms part of the Manchester Mosses SAC), Abram Flashes SSSI and Bryn Marsh and Ince Moss SSSI. Other relevant local sensitive ecological sites identified close to the Proposed Scheme include Gorse Covert Mounds Local Wildlife Site (LWS), Pestfurlong Moss LWS, Eleven Acre Common LWS, Silver Lane Ponds LWS, Abram Flashes Site of Biological Importance (SBI), Edge Green SBI, Edge Green Common SBI, Ponds near Lightshaw Lane SBI, Wigan Flashes Local Nature Reserve (LNR) and Horrocks Flash SBI.

Future baseline

5.3.13 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to be implemented by 2025. The potential cumulative impact from committed developments on air quality in conjunction with the effects from the construction and operation of the Proposed Scheme has been considered as part of this assessment. The future air quality baselines are defined as the 'without the Proposed Scheme' scenarios at each stage.

Construction (2025)

5.3.14 Future background pollutant concentrations have been sourced from the Defra background maps for the first year of construction in 2025, which predict NO_2, PM_{10} and $PM_{2.5}$ levels in 2025 to be lower than in the 2018 baseline and within the relevant air quality standards.

5.3.15 Committed developments that have been included as future receptors in the assessment of air quality impacts during construction of the Proposed Scheme are identified in Volume 5:

AQ-001-0MA05. No additional committed developments have been identified in this study area that will materially alter the baseline conditions in 2025 for air quality.

Operation (2038)

5.3.16 Future background pollutant concentrations have been sourced from the Defra background maps for 2030, which is the latest available year of data. These predict NO_2, PM_{10} and $PM_{2.5}$ levels in 2030 to be lower than in the 2018 baseline and within the relevant air quality standards. The 2030 background maps have been used as representative of the future baseline conditions during operation of the Proposed Scheme.

5.3.17 Committed developments that have been included as future receptors in the assessment of air quality impacts during operation of the Proposed Scheme are identified in Volume 5: AQ-001-0MA05. No additional committed developments have been identified in this study area that will materially alter the baseline conditions in 2038 for air quality.

5.4 Effects arising during construction

Avoidance and mitigation measures

5.4.1 Emissions to the atmosphere will be controlled and managed during construction through the route-wide implementation of the Code of Construction Practice (CoCP). The draft CoCP[30] includes a range of mitigation measures that are accepted by the Institute of Air Quality Management (IAQM) as being suitable to reduce impacts to as low a level as is reasonably practicable. These measures are generally sufficient to avoid any significant effects from dust during construction.

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

- contractors being required to manage dust, air pollution, odour and exhaust emissions during construction works;
- inspection and visual monitoring, undertaken in consultation with the local authorities, to assess the effectiveness of the measures taken to control dust and air pollutant emissions;
- cleaning (including watering) of vehicle routes and designated vehicle waiting areas to suppress dust;
- the use of water spray systems on demolition sites to dampen down fugitive dust;
- keeping soil stockpiles away from sensitive receptors where reasonably practicable, also taking into account the prevailing wind direction relative to sensitive receptors;
- the use of enclosures to contain dust emitted from construction activities; and

[30] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

- 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.

5.4.4 Prior to commencement of activities, there will be further detailed assessment for each worksite to determine site specific dust mitigation.

Assessment of impacts and effects

Temporary effects

5.4.5 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 NO_2, PM_{10} and $PM_{2.5}$ concentrations.

Construction dust effects

5.4.6 The risks of demolition of existing buildings, earthworks, construction of new structures and trackout have been assessed for their effect on dust soiling, human health and ecological sites. 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. The human health effects of dust relate mainly to short-term exposure to PM_{10}.

5.4.7 The identified risks potentially arising from construction dust within the Risley to Bamfurlong area are shown in Table 13. The risks are dependent on the magnitude of dust generating activities and the location of sensitive receptors in relation to these activities. A range of risks is shown, as there are several construction locations in the area.

Table 13: Summary of risks for construction dust assessment

Activity	Dust soiling	Human health	Ecological effects
Demolition	Low to high	Low to medium	Not applicable
Earthworks	Medium to high	Low to medium	Low to high
Construction	Medium to high	Low to medium	Low to high
Trackout	Medium to high	Low to medium	Low to medium

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. Further details of the assessment can be found in Volume 5: Appendix AQ-001-0MA05 where the scale of dust emissions and the sensitivity of the area and receptors are fully described.

Construction traffic effects

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

5.4.10 The assessment of construction traffic emissions has been undertaken for a 'without the Proposed Scheme' scenario and a 'with the Proposed Scheme' scenario. The traffic data for each scenario include the additional traffic from future committed developments.

5.4.11 Construction traffic data in the study area have been screened to identify roads that required further assessment and to confirm the likely effect of the change in emissions from vehicles using those roads during construction of the Proposed Scheme. There were two construction traffic scenarios assessed in this area.

5.4.12 Receptors expected to experience the greatest change in concentrations have been included in the air quality model. Thirteen modelled residential receptors are predicted to experience significant adverse effects for NO_2 concentrations in the Risley to Bamfurlong area. These receptors are located adjacent to the M6 and B5207 Downall Green Road in Ashton-in-Makerfield. However, NO_2 concentrations in these areas are predicted to exceed the air quality standard even without the Proposed Scheme. No significant effects are predicted in relation to annual mean PM_{10} and $PM_{2.5}$ concentrations.

5.4.13 Nitrogen deposition is predicted to increase by more than 1% of the critical load at Manchester Mosses SAC/Holcroft Moss SAC as a result of the Proposed Scheme. The potential for this increase to result in significant ecological effects is addressed further in Section 7, Ecology and biodiversity of this report. No significant air quality effects are anticipated at any of the other ecological receptors in this area.

Permanent effects

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

Other mitigation measures

5.4.15 Measures to monitor, manage and reduce significant air quality effects are set out in Section 7 of the draft CoCP. No further mitigation measures in relation to air quality during construction of the Proposed Scheme have been identified in this area.

Summary of likely residual significant effects

5.4.16 The methods outlined within the draft CoCP are considered effective at reducing dust emissions, and therefore, no significant residual effects are anticipated from this source. There will be a residual significant adverse effect in relation to NO_2 concentrations at 13

modelled residential receptors adjacent to the M6 and B5207 Downall Green Road in Ashton-in-Makerfield.

Cumulative effects

5.4.17 The data used in the air quality assessment take account of predicted changes in traffic as a result of committed developments in the area, and therefore, their impacts have been included within the assessment. It is assumed that dust emissions from construction of other developments in the area will be controlled by appropriate measures as set out within their respective environmental management controls, and therefore, no cumulative effects for air quality are anticipated.

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 will arise from changes in the volume, composition and/or speed of road traffic, changes in road alignment.

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

Operational traffic effects

5.5.4 The assessment of operational traffic emissions has been undertaken for a 'without the Proposed Scheme' scenario and a 'with the Proposed Scheme' scenario in 2038. The traffic data for each scenario include the additional traffic from future committed developments.

5.5.5 Traffic data in the study area have been screened to identify roads that required further assessment and to confirm the likely effect of the change in emissions from vehicles using those roads during operation of the Proposed Scheme. There were seven roads screened in for further assessment in the Risley to Bamfurlong area which were the A574 Warrington Road, Glaziers Lane, Wigshaw Lane, Slag Lane, Byrom Lane, the B5207 Wilton Lane and the A573 Wigan Road/Aye Bridge Road.

5.5.6 Receptors expected to experience the greatest change in concentrations have been included in the air quality model. No significant effects are predicted at any modelled receptors during operation of the Proposed Scheme. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ are within the relevant air quality standards both with and without the Proposed Scheme. No significant effects are anticipated at any of the ecological receptors in this area.

Other mitigation measures

5.5.7 No other mitigation measures are proposed in relation to air quality during operation of the Proposed Scheme.

Summary of likely residual significant effects

5.5.8 No significant residual effects are anticipated for air quality in this area during operation of the Proposed Scheme.

Cumulative effects

5.5.9 The data used in the air quality assessment take account of predicted changes in traffic as a result of committed developments in the area, and therefore, their impacts have been included within the assessment.

Monitoring

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

5.5.11 On the basis of there being no significant residual operational effects, there are no area-specific requirements for monitoring air quality effects during operation of the Proposed Scheme in the Risley to Bamfurlong area.

6 Community

6.1 Introduction

6.1.1 This section of the report describes the baseline, impacts and likely significant effects on local communities resulting from the construction and operation of the Proposed Scheme in the Risley to Bamfurlong.

6.1.2 The assessment draws on information gathered from engagement with the users and operators of community resources. Local authorities, parish councils and operators of community resources that have been engaged with are identified in Section 3, Stakeholder engagement and consultation. The purpose of this engagement has been to understand how the resources are used and to obtain relevant baseline information to inform the design development and assessment of the Proposed Scheme.

6.1.3 Further details of the community assessments undertaken within the Risley to Bamfurlong area are contained in Volume 5: Appendix CM-001-0MA05.

6.1.4 Community assessment maps are provided in the Map Series CM-01 in Volume 5, Community Map Book. 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, MA05 Map Book. The Proposed Scheme is described in Section 2.

6.1.5 All distances, lengths and area measurements provided in this section are approximate.

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 EIA Scope and Methodology Report (SMR)[31].

6.2.2 The study area includes the land required both temporarily and permanently for the construction and operation of the Proposed Scheme. It also includes a wider area including proposed construction traffic routes within which community resources could be affected by a combination of two or more significant residual effects arising from noise, vibration, poor air quality, heavy goods vehicles (HGV)[32] traffic, and visual intrusion. Overall, the study area is taken as the area of land that encompasses the likely significant community effects of the Proposed Scheme.

[31] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

[32] HGV traffic effects are where there is a 30% or more increase in HGV traffic movements which have been identified as significant by traffic and transport. The increase in HGV traffic results in a traffic-related severance effect for non-motorised users. They contribute to in-combination effects on community resources that are located adjacent to the routes that experience the increase in HGV movements.

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 in Section 14, Traffic and transport. However, where PRoW and other routes are a promoted destination in their own right as a recreation resource, they have been considered within this assessment. Where impacts on public open space and recreational routes 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 will 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. 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.

6.2.5 Isolation effects may arise from either physical islanding of properties or an increase in journey times and/or distance between residential areas and the community resources that residents use on a regular basis.

6.2.6 The assessment of in-combination effects draws upon: Section 5, Air quality; Section 11, Landscape and visual; Section 13, Sound, noise and vibration; and Section 14, Traffic and transport. Likely significant in-combination effects on community resources are reported in this Section. Durations of in-combination effects on community resources have been identified where information on the duration of contributing effects is provided in the relevant source assessments.

6.2.7 Due to the large number and relatively high density of public houses, cafes, restaurants and other food outlets in the study area, impacts on these resources are only assessed where the nearest alternative resources are over 1km away, unless they have been identified as highly valued by the local community.

6.2.8 No area-specific limitations or assumptions have been identified for this area.

6.3 Environmental baseline

Existing baseline

6.3.1 The Risley to Bamfurlong area covers a 12.7km section of the route of the Proposed Scheme. The route passes through the parishes of Birchwood, Croft, Culcheth and Glazebury. Warrington Borough Council (WBC) and Wigan Metropolitan Borough Council (WMBC) are the local authorities in the area. The southern boundary of this area is the boundary between the parishes of Rixton-with-Glazebrook and Birchwood. The connection to the WCML forms the northern extent of the Proposed Scheme in the area.

6.3.2 The Risley to Bamfurlong area is predominantly rural in nature. In general, the majority of community facilities are located in the settlements of Culcheth, Lowton, Golborne and

Abram. There are also other settlements, clusters of residential properties and individual farms within the Risley to Bamfurlong area.

Risley, Culcheth and Surrounds

6.3.3 This area covers the settlements of Risley, Birchwood, Culcheth and surrounds, from the southern boundary of the Risley to Bamfurlong area to the A580 East Lancashire Road.

6.3.4 Risley comprises approximately 40 residential properties. The nearest residential properties are located 1.4km south of the route of the Proposed Scheme. There are a range of community facilities within Risley.

6.3.5 Birchwood is a suburb of Warrington comprising approximately 1,200 residential properties. The nearest residential properties are located 850m south of the route of the Proposed Scheme. Community resources within Birchwood include The Village Pre-School, Gorse Covert Primary School, Gorse Covert Day Centre for adults with learning and physical disabilities and The Poacher public house. Within the study area is Gorse Covert Mounds, a 19.6ha urban woodland located to the north of Gorse Covert.

6.3.6 Croft comprises approximately 550 residential properties. The nearest residential properties are located 700m south of the route of the Proposed Scheme. Community resources within Croft include Croft Primary School, Croft Riding Centre, Christ Church and two public houses (The Horseshoe Inn and The General Elliot).

6.3.7 Little Town comprises approximately 50 residential properties. The nearest residential properties are located 500m south-west of the route of the Proposed Scheme. Community resources within Little Town are St Lewis' Catholic Primary School and Saint Lewis' Catholic Church.

6.3.8 Culcheth is a settlement comprising approximately 3,000 residential properties. The nearest residential properties are located 350m to the north of the route of the Proposed Scheme. Community resources within Culcheth include Newchurch Community Primary School, Culcheth Methodist Church, and recreational facilities such as Culcheth Sports Club, Culcheth Linear Park and Wild Wings Bird of Prey Centre. Culcheth also has several public houses, a library and medical facilities. On the south-eastern outskirts of Culcheth is the Oaks recreational ground, which comprises six football pitches and is the site for the Culcheth Athletic Junior Football Club. This is adjacent to the site of Yew Tree Farm Caravan Site, which is used for both short and long stays. On the north-east outskirts of the village is Leigh Golf Club and golf course and Laylands Farm Campsite.

6.3.9 Wigshaw comprises approximately 20 residential properties. The nearest residential properties are located 70m north-west of the route of the Proposed Scheme. Warehouse Studios is a group of businesses located on Glaziers Lane. English Karate Academy, a karate school offering lessons for people of all ages, is located within Warehouse Studios. Partridge Lakes Fishery, a 28ha recreational fishing facility, is located immediately to the south of the route of the Proposed Scheme.

Lowton, Golborne and surrounds

6.3.10 This area covers the settlements of Lowton, Golborne and surrounds, from the A580 East Lancashire Road to the A573 Wigan Road.

6.3.11 The route of the Proposed Scheme will pass through Lowton, which comprises various suburbs including Lowton Common, Lowton St Mary's and Wash End. Lowton (including its suburbs), has approximately 5,100 residential properties and a range of community facilities. There are residential properties located on the route of the Proposed Scheme.

6.3.12 Most of the community facilities in Lowton are located to the west of the route of the Proposed Scheme. Educational facilities include Lowton Junior and Infant School, St. Luke's Church of England Primary School, St. Catherine's Catholic Primary School, Green Meadow Independent Primary School and First Steps Private Day Nursery. Elmridge Court and Lowton Youth and Community Centre are also located to the west of the route of the Proposed Scheme. Elmridge Court is an assisted living and close care complex. Lowton Youth and Community Centre provides a café, sport and recreation and health services to the local community.

6.3.13 To the east of the route of the Proposed Scheme, community facilities include Lowton St Mary's Church of England Primary School and Nursery, Lowton Church of England High School, Lowton St Mary's Parish Church and Independent Methodist Church Lowton.

6.3.14 Hesketh Meadows Playing Fields, which is on Hesketh Meadow Lane in Lowton Common, is a recreational open space with seven football pitches, home to East Leigh Junior Football Club and is on the route of the Proposed Scheme. Gymetc. is located to the west of the route of the Proposed Scheme on the A572 Newton Road and is a private membership gym with swimming facilities and a range of fitness classes.

6.3.15 Golborne is a settlement comprising approximately 6,100 residential properties located to the west of the route of the Proposed Scheme. The nearest residential properties are located 700m south-west of the route of the Proposed Scheme. Golborne has a range of community facilities, including the following in the study area: Lowton West Primary School, Golborne High School, Slag Lane Medical Centre, Roadside Court Community Centre and Golborne Parkside Sport and Community Club.

6.3.16 Greenheart Regional Park offers promoted routes for walkers, cyclists and horse riders, which links a series of Greenheart sites, including Pennington Flash Country Park and Byrom Wood. Pennington Flash Country Park is located to the east of the route of the Proposed Scheme, between Lowton and Pennington. Byrom Wood is an area of 27ha of publicly accessible woodland and walking routes, which is on the route of the Proposed Scheme, and to the east of Pennington Flash. Other community facilities within Greenheart Regional Park include Pennington Golf Course, Leigh and Lowton Sailing Club, horse riding and fishing facilities, walking routes, and play and picnic areas. Recreational routes in the area include National Route 55 of the National Cycle Network, a predominantly traffic-free route that links Ironbridge to Preston.

Abram, Bamfurlong and surrounds

6.3.17 This area covers the settlements of Abram, Bamfurlong and surrounds, from the A573 Wigan Road to the Leeds and Liverpool Canal and the B5327 Bickershaw Lane in the north.

6.3.18 Abram comprises approximately 2,100 residential properties. The nearest residential properties are located 600m to the east of the route of the Proposed Scheme. Community resources within Abram include St John's Church of England Primary School, Abram Community Centre, Abram St John the Evangelist Parish Church, and three recreation grounds.

6.3.19 Bamfurlong comprises approximately 400 residential properties. The nearest residential properties are located 150m to the north-west of the route of the Proposed Scheme. Community facilities in Bamfurlong include Abram Bryn Gates Primary School, Bamfurlong Methodist Church, Church of the Good Shepherd, Bryn Hall public house and Bamfurlong Recreation Ground.

6.3.20 Viridor Wood is an area of 100ha of open space and woodland south of Bamfurlong, located immediately west of the route of the Proposed Scheme. Viridor Wood includes several leisure walking routes.

Future baseline

Construction (2025)

6.3.21 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. The following committed developments of relevance to the community assessment that would materially alter the future baseline during construction of the Proposed Scheme in this area, are set out in Table 14.

Table 14: Committed developments of relevance to community during construction

Map book reference[33]	Planning reference	Description	How this is considered in the assessment
MA05/092	SP4.5	Location: Pocket Nook Lane, Lowton. Partially within land required for construction of the Proposed Scheme - allocation implementable on a reduced area - approx 5% of allocated site would be permanently occupied by the Proposed Scheme. Layout can be configured to take account of the Proposed Scheme.	Informing future baseline.

[33] Volume 5, Planning Data/Committed Development Map Book: Maps CT-13-314b to CT-13-318.

Map book reference[33]	Planning reference	Description	How this is considered in the assessment
MA05/089	A/17/84401/OUTMAJ	Location: Pocket Nook Lane, Lowton Outline Planning Application for demolition of existing buildings and construction of 100% Market Housing in accordance with the previous Planning Permission (A/10/74938), accessed from Pocket Nook Lane together with all Associated Works.	Informing future baseline.
MA05/088	A/18/86062/RMMAJ	Location: Pocket Nook Lane, Lowton Application for the erection of 49 dwellings consisting of 12 number one-bedroom flats, 12 number two-bedroom houses, and 25 three-bedroom houses, following demolition of bungalow.	Informing future baseline.
MA05/287	A/18/86359/MAJOR	Location: site of former St Catherine of Sienna Roman Catholic Church, Newton Road Lowton Warrington WA3 1LB. Residential development of 26 dwellings with associated garages, landscaping, parking and access.	Informing future baseline.
MA05/039	2016/27387	Location: Culcheth Arms, Church Lane, Warrington. Construction of 10 dwellings with associated access and parking.	Informing future baseline.
MA05/109	A/18/85351/MAJOR	Location: Ullswater Road, Golborne. New build development of new autism centre with 13 apartments and 19 bungalows.	Informing future baseline.
MA05/363	A/18/85361/MAJOR	Location: Lee Lane, Abram. To erect 18 two-storey dwellings with access off Lee Lane.	Informing future baseline.
MA05/353	A/18/86157/MAJOR	Location: Oaklands,196 Newton Road, Lowton, Warrington. Residential development of 28 dwelling houses comprising of six two-storey detached dwellings, 16 two-storey semi-detached dwellings and six, two and a half-storey dwellings with parking and landscaping following demolition of existing building.	Informing future baseline.

6.3.22 It is assumed that the following committed developments will be implemented and have been included as part of the future baseline and considered within this assessment:

- MA05/092 will result in a residential development located partially within the land required for the construction of the Proposed Scheme;
- MA05/089 will result in a residential development located partially within the land required for the construction of the Proposed Scheme;
- MA05/088 will result in a residential development located partially within the land required for the construction of the Proposed Scheme;
- MA05/287 will result in a residential development located 355m to the west of the land required for the construction of the Proposed Scheme;
- MA05/039 will result in a residential development located 413m north-east of the land required for the construction of the Proposed Scheme;

- MA05/109 will result in a residential autism centre located 595m south-west of the land required for the construction of the Proposed Scheme;
- MA05/363 will result in a residential development located 360m to the east of the land required for the construction of the Proposed Scheme; and
- MA05/353 will result in a residential development located immediately to the west of the land required for the construction of the Proposed Scheme.

Operation (2038)

6.3.23 Volume 5: Appendix CT-004-00000 also provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No additional committed developments of relevance for the community assessment have been identified that would materially alter the future baseline in this area.

6.4 Effects arising during construction

Avoidance and mitigation measures

6.4.1 The following measures have been incorporated into the Proposed Scheme as part of the design development process to avoid or reduce, insofar as reasonably practicable, the environmental impacts during construction:

- revised design for the realignment of the A574 Warrington Road, which will be150m east of the existing alignment to reduce impacts to Culcheth Oaks recreational ground, the site of Culcheth Athletic Football Club and Yew Tree Farm Caravan Site; and
- Footpath Golborne 33/10 and Footpath Golborne 31/10 will be realigned permanently to maintain access to either side of Byrom Wood. The underbridges in this location will provide pedestrian access between the two halves of the woodland (i.e. maintaining the existing circular walk).

6.4.2 The draft Code of Construction Practice (CoCP)[34] includes a range of provisions that will help mitigate community effects associated with construction of the Proposed Scheme within this area, including:

- implementation of a community engagement framework and the provision of appropriately experienced community relations personnel to implement the framework, to provide appropriate information and to be the first point of contact to resolve community issues (Section 5 of the draft CoCP);
- sensitive layout of construction sites to reduce nuisance as far as possible (Section 5 of the draft CoCP);
- maintenance of PRoW during construction where reasonably practicable (Section 14 of the draft CoCP);

[34] Volume 5: Appendix CT-002-00000, Draft Code of Construction Practice.

- monitoring and management of flood risk and other extreme weather events, where reasonably practicable, which may affect community resources during construction (Section 16 of the draft CoCP);
- 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 of the draft CoCP); and
- where practicable, the avoidance of HGVs operating adjacent to schools during drop off and pick-up periods (Section 14 of the draft CoCP).

Assessment of impacts and effects

Risley, Culcheth and surrounds

Temporary effects

Residential properties

6.4.3 Construction of the Proposed Scheme, including utility works and/or highways works, will be required on residential land in the area. Where the scale of impact will be small, and the duration short (up to three months), these works will result in minor adverse effects, which will not be significant at a community level. A description of the affected properties is included within Volume 5: Appendix CM-001-0MA05.

6.4.4 Construction the Proposed Scheme will be in proximity to approximately 10 residential properties on the A574 Warrington Road, Risley. Residents of these properties will be affected by a combination of significant noise and visual effects during construction of the A574 Warrington Road realignment. Significant noise effects from these works will last for approximately four months. The A574 Warrington Road is a designated route for construction traffic to access A574 Warrington Road satellite compound and is expected to experience a significant increase in HGV traffic movements (between Cross Lane and New Hall Lane). Together these noise, visual and HGV traffic effects will result in a moderate adverse in-combination effect on amenity for residents at these properties, which is significant.

6.4.5 Construction of the Proposed Scheme will be adjacent to approximately 10 residential properties on Wigshaw Lane and Robins Lane in Wigshaw. Residents of these properties will be affected by a combination of significant noise and visual effects due to construction of Culcheth cutting. Significant noise effects from these works will last for approximately 11 months. Together these noise and visual effects will result in a major adverse in-combination effect on amenity for residents at these properties, which is significant.

Community facilities

6.4.6 No temporary construction effects on community facilities are anticipated in this area.

Recreational facilities

6.4.7 No temporary construction effects on recreational facilities are anticipated in this area.

Public open space and recreational routes

6.4.8 No temporary construction effects on public open space or recreational routes are anticipated in this area.

Permanent effects

Residential properties

6.4.9 The construction of Culcheth cutting will require the demolition of four residential properties: one on Wigshaw Lane and three on Glaziers Lane, Wigshaw. These residential properties will be permanently lost. The loss of these four residential properties represents a high proportion of this small community of 20 residential properties. This will result in a major adverse effect, which is significant.

Community facilities

6.4.10 Construction of Culcheth cutting will require the demolition of English Karate Academy in Warehouse Studios on Glaziers Lane. English Karate Academy offers karate classes for children, adults and families at all levels. There are limited alternative facilities in the area, the closest being in Lowton. Therefore, the loss of this facility in this location will result in a major adverse effect, which is significant.

Recreational facilities

6.4.11 No permanent construction effects on recreational facilities are anticipated in this area.

Public open space and recreational routes

6.4.12 No permanent construction effects on public open space or recreational routes are anticipated in this area.

Lowton, Golborne and surrounds

Temporary effects

Residential properties

6.4.13 Construction of the Proposed Scheme, including utility works and/or highways works, will be required on residential land in the area. Where the scale of impact will be small, and the duration short (up to three months), these works will result in minor adverse effects, which will not be significant at a community level. A description of the affected properties is included within Volume 5: Appendix CM-001-0MA05.

6.4.14 The A573 Church Street is a designated route for construction traffic and is expected to experience a significant increase in HGV traffic movements. These significant HGV traffic effects are expected to combine with significant traffic noise effects on approximately 120 residential properties on Church Street, between Heath Street and the B5207 Lowton Road, during the peak months of construction. Together these noise and HGV traffic effects will result in a moderate adverse in-combination effect on amenity for residents at these properties, which is significant.

6.4.15 Construction of the Proposed Scheme will be in proximity to approximately 90 properties in Lowton (Lowton Common, Lowton St. Mary's and Wash End). Residents of these properties will experience a combination of significant noise and visual effects during construction of Lowton cutting. Significant noise effects from these works will last for approximately one year and eight months. Together these noise and visual effects will result in a major adverse in-combination effect on amenity for residents at these properties, which is significant.

6.4.16 Construction of the Proposed Scheme will be in proximity to approximately 10 properties in Little Byrom, on Byrom Lane and Slag Lane. Residents of these properties will experience a combination of significant noise and visual effects during construction of Slag Lane viaduct and Slag Lane realignment. Significant noise from these works will last for approximately one year and five months. Slag Lane is a designated route for construction traffic for access to Slag Lane satellite compound. Slag Lane is expected to experience a significant increase in HGV traffic movements, between Manor Avenue and Byrom Lane. Together these noise, visual and HGV traffic effects will result in a major adverse in-combination effect on amenity for residents at these properties, which is significant.

Community facilities

6.4.17 Construction of the Proposed Scheme will take place in proximity to Lowton Junior and Infant School on the A572 Newton Road, Lowton. The A572 Newton Road is the sole access to the school and will be used as a construction traffic route, enabling access to A572 Newton Road satellite compound. A580 East Lancashire Road main compound will be located adjacent to the school, south of the school playing fields. Construction of A572 Newton Road overbridge highway works and Lowton cutting will be located directly to the east of the school buildings and playground. The construction activities will result in significant visual effects. In addition, a significant adverse noise effect has been identified at the school on a precautionary basis. The noise effect will last for approximately three years and three months. Together the noise and visual effects will result in a major adverse in-combination effect on amenity for users of Lowton Junior and Infant School, which is significant.

Recreational facilities

6.4.18 No temporary construction effects on recreational facilities are anticipated in this area.

Public open space and recreational routes

6.4.19 No temporary construction effects on public open space or recreational routes are anticipated in this area.

Permanent effects

Residential properties

6.4.20 The construction of Lowton cutting will require the demolition of three residential properties on the B5207 Wilton Lane, south-east of Lowton. These residential properties will be permanently lost.

6.4.21 The construction of Lowton cutting will require the demolition of eight residential properties on the A572 Newton Road, Lowton. These residential properties will be permanently lost. This will result in a moderate adverse effect, which is significant.

6.4.22 The construction of Slag Lane viaduct and Slag Lane realignment will require the demolition of two residential properties on Slag Lane, near Lowton. These residential properties will be permanently lost.

6.4.23 The construction of Lowton North embankment will require the demolition of two residential properties on Lightshaw Lane, on the outskirts of Golborne. These residential properties will be permanently lost.

Community facilities

6.4.24 No permanent construction effects on community facilities are anticipated in this area.

Recreational facilities

6.4.25 No permanent construction effects on recreational facilities are anticipated in this area.

Public open space and recreational routes

6.4.26 Construction of Lowton cutting will permanently require all 5.6ha of Hesketh Meadows Playing Fields. The playing fields comprise seven football pitches that are used regularly by East Leigh Junior Football Club, a football club for children up to the age of 18. The Club presently has 17 teams (ranging from under sevens to under 18s) and an academy for children aged under six. Hesketh Meadows is also used for informal recreation by local residents. The loss of land at Hesketh Meadows is considered to be a major adverse effect, which is significant.

6.4.27 An area of land at Cheetham Fold Farm, adjacent to the existing playing fields, has been identified to replace Hesketh Meadows Playing Fields in a like for like manner. By road, the replacement is 700m away from the existing playing fields. Therefore, taking into account this mitigation, the permanent loss of Hesketh Meadows Playing Fields will result in a negligible effect which is not significant.

6.4.28 Construction of Lowton North embankment will permanently bisect Byrom Wood requiring approximately 4ha of land (14% of the total woodland area). Byrom Wood, which is located to the north-east of Golborne, is approximately 27ha of woodland with footpaths and permissive paths offering a 1.5km circular route. It is a locally valued resource, and the nearest comparable alternative open space is located at Pennington Flash Country Park, which is approximately 1km away. Byrom Wood is accessible via Slag Lane and footpaths provide pedestrian access to all four corners of the woodland. During construction, access will be maintained through a temporary realignment of Footpath Golborne 33/10 and Footpath Golborne 31/10. The permanent requirement for land at Byrom Wood will result in a moderate adverse effect, which is significant.

Abram, Bamfurlong and surrounds

Temporary effects

Residential properties

6.4.29 Construction of the Proposed Scheme, including utility works and/or highways works, will be required on residential land in the area. Where the scale of impact will be small, and the duration short (up to three months), these works will result in minor adverse effects, which will not be significant at a community level. A description of the affected properties is included within Volume 5: Appendix CM-001-0MA05.

Community facilities

6.4.30 No temporary construction effects on community facilities are anticipated in this area.

Recreational facilities

6.4.31 No temporary construction effects on recreational facilities are anticipated in this area.

Public open space and recreational routes

6.4.32 No temporary construction effects on public open space or recreational routes are anticipated in this area.

Permanent effects

6.4.33 No permanent construction effects are anticipated in this area.

Other mitigation measures

6.4.34 HS2 Ltd will work closely with Lowton Junior and Infant School to identify reasonably practicable measures to mitigate the residual significant amenity effects, including discretionary measures identified in the draft CoCP.

6.4.35 HS2 Ltd will continue to work with WMBC to assist with the process of using land at Cheetham Fold Farm Stables as replacement for the loss of resource at Hesketh Meadows Playing Fields. The provision of this alternative land is required to mitigate loss of land from Hesketh Meadows required to construct the Proposed Scheme.

6.4.36 HS2 Ltd will work with the local community, the Forestry Commission and WMBC to review mitigation measures and determine reasonably practicable methods to mitigate the severance of the existing permissive circular footpath in Byrom Wood. Such measures will aim to provide new sections of permissive footpath to create a new circular walk in the vicinity of Byrom Wood, on land required for the construction of the Proposed Scheme.

Summary of likely residual significant effects

6.4.37 The construction of the Proposed Scheme will result in significant temporary residual effects on the following community resources:

- approximately 10 residential properties on Warrington Road, Risley, due to the combination of noise, visual and HGV traffic effects;
- approximately 10 residential properties in Wigshaw, due to the combination of noise and visual effects;
- approximately 120 residential properties in Golborne, due to the combination of noise and HGV traffic effects;
- approximately 90 residential properties in Lowton, due to the combination of noise and visual effects;
- approximately 10 residential properties in Little Byrom, due to the combination of noise, visual and HGV traffic effects; and
- Lowton Junior and Infant School due to the combination of noise and visual effects.

6.4.38 The construction of the Proposed Scheme is likely to result in the following permanent residual significant effects:

- loss of four residential properties on Glaziers Lane and Wigshaw Lane in Wigshaw;
- loss of English Karate Academy in Warehouse Studios on Glaziers Lane;
- loss of eight residential properties on Newton Road, Lowton; and
- land permanently required in Byrom Wood, resulting in the severance of the existing permissive circular footpath.

Cumulative effects

6.4.39 No temporary or permanent cumulative effects have been identified in the Risley to Bamfurlong area.

6.5 Effects arising from operation

Avoidance and mitigation measures

6.5.1 The following measures have been incorporated into the Proposed Scheme design as part of the design development process to avoid or reduce environmental impacts during operation:

- landscape mitigation planting and associated earthworks along Culcheth South embankment between the M62 and the A574 Warrington Road, along New Hall Lane and along Glaziers Lane will provide visual screening for residents of properties along the B5212 Holcroft Lane and in Culcheth;
- landscape mitigation planting and associated earthworks along Culcheth cutting will provide visual screening for residents of properties in Culcheth, along the A574 Warrington Road and along Wigshaw Lane;
- landscape mitigation planting at Culcheth North embankment will provide visual screening for residents of properties on New Lane End;
- earthworks and landscape mitigation planting along Lowton cutting will provide visual screening for residents of properties in Lowton, along the B5207 Wilton Lane and for Lowton Junior and Infant School. Noise fence barriers in the same location will provide acoustic screening for residents of properties at Wash End and Lowton Common;
- landscape mitigation planting and noise fence barriers along Lowton South embankment will provide visual and acoustic screening for residents of properties in Lowton and along Sandy Lane and Byrom Lane; and
- landscape mitigation planting and noise fence barriers along Lowton North embankment will provide visual and acoustic screening for residents of properties in Lowton, Abram and Garton Common and for users of Byrom Wood.

Assessment of impacts and effects

Risley, Culcheth and surrounds

6.5.2 The Proposed Scheme will be 60m south of a group of approximately 10 residential properties on Wigshaw Lane and Robins Lane in Wigshaw. The operation of the Proposed Scheme will result in significant visual effects due to overhead line equipment and the presence of the realigned Wigshaw Lane and overbridge, and significant noise effects due to trains running in Culcheth cutting and road traffic noise from the realigned road. Together these noise and visual effects will result in a major adverse in-combination effect on amenity for residents at these properties, which is significant.

Lowton, Golborne and surrounds

6.5.3 No operational effects are anticipated in this area.

Abram, Bamfurlong and surrounds

6.5.4 No operational effects are anticipated in this area.

Other mitigation measures

6.5.5 No further mitigation is proposed.

Summary of likely residual significant effects

6.5.6 The operation of the Proposed Scheme will result in residual significant effects on approximately 10 residential properties in Wigshaw due to the combination of noise and visual effects.

Cumulative effects

6.5.7 No cumulative effects have been identified in the Risley to Bamfurlong area.

Monitoring

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

6.5.9 Any area-specific operational monitoring requirements in relation to air quality effects, noise and vibration effects, traffic effects and visual effects that have contributed to the in-combination assessments, are described in the relevant sections of this Volume 2 report.

7 Ecology and biodiversity

7.1 Introduction

7.1.1 This section of the report describes the ecological baseline and identifies the predicted impacts and likely significant effects on habitats and species that will arise from construction and operation of the Proposed Scheme in the Risley to Bamfurlong area. This includes effects on sites recognised or designated on the basis of their importance for nature conservation.

7.1.2 Engagement has been undertaken with stakeholders including Natural England, the Environment Agency, the Forestry Commission, Cheshire Wildlife Trust, Woodland Trust, Canal & River Trust, Lancashire Wildlife Trust and Greater Manchester Local Record Centre. The purpose of this engagement has been to obtain relevant baseline information and inform the design development and assessment of the Proposed Scheme.

7.1.3 Volume 5 contains supporting information to the ecological assessment reported in this section, including:

- ecological baseline data – designated sites (see Volume 5: Appendix EC-001-00001);
- an ecological register of local level effects, which are not reported individually in Volume 2 (Volume 5: Appendix EC-015-0MA05); and
- document to inform a Habitats Regulations Assessment (HRA) for the Manchester Mosses Special Area of Conservation (SAC) (see Volume 5: Appendix EC-016-00002).

7.1.4 Map Series EC-01 showing statutory and non-statutory designated sites of relevance to the assessment in the Risley to Bamfurlong area is provided in the Volume 5, Ecology Map Book.

7.1.5 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, MA05 Map Book.

7.1.6 In addition, ecological baseline information relating to habitats and species recorded in the Risley to Bamfurlong area is set out in Background Information and Data (BID)[35] (BID EC-002-00001 to BID EC-014-00001[36]) and accompanying Map Series EC-02 and EC-04 to EC-12 (BID Ecology Map Books).

7.1.7 The Proposed Scheme is described in Section 2.

7.1.8 All distances, lengths and area measurements in this section are approximate.

[35] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data*. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

[36] Note that BID EC-014-00001 contains data on badgers and is not published.

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 EIA Scope and Methodology Report (SMR)[37] and in the Field Survey Methods and Standards (FSMS), which is included as an annex to the SMR.

7.2.2 A route-wide Water Framework Directive (WFD) compliance assessment has been undertaken in conjunction with the environmental assessment (Section 15, Water resources and flood risk). Details of the assessment are set out in Volume 5: Appendix WR-003-0MA05.

7.2.3 Access was obtained for the majority of the land where general habitat survey (Phase 1 Habitat Survey) was proposed. However, access could not be gained in time for seasonally constrained surveys at part of Ponds Near Lightshaw Lane Site of Biological Importance (SBI), which has potential to support key ecological features. Further details are provided in Background Information and Data: BID EC-002-00000 to BID EC-014-00000.

7.2.4 Where data are limited, such as due to the absence of field surveys, a precautionary baseline has been built up according to the guidance reported in the SMR. This constitutes a 'reasonable worst case' basis for the subsequent assessment and development of mitigation.

7.2.5 BID EC-002-00000 to BID EC-014-00000 identifies survey locations. Where the assessment has been based upon limited data, the ecological receptor is described as 'of up to' a specific value to indicate that a precautionary approach has been applied.

7.2.6 The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the Proposed Scheme. Use of the precautionary approach ensures that any limitations arising from the age of datasets are taken into account. Unless otherwise stated, the description of effects assumes that all land within Bill limits will be subject to habitat loss resulting from development of the Proposed Scheme, with the land required for construction purposes only being reinstated following completion of construction. This includes areas identified specifically for habitat creation. With respect to utility works, on a precautionary basis it is normally assumed that all habitat is lost from the land required for the Proposed Scheme. This is assumed to be temporary except for mature woodland and areas of high-quality habitat. However, for some utility works, such as decommissioning of existing utilities, the construction methods are such that it has been possible to exclude significant effects on receptors within the land required for the construction of the Proposed Scheme at Holcroft Moss Site of Special Scientific Interest (SSSI).

[37] Volume 5: Appendix CT-001-00001, 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. Further details are provided in the reports presented in Volume 5: Appendix EC-001-00001 and BID: BID EC-002-00001 to BID EC-014-00001, and maps presented in Volume 5, Map Series EC-01 and BID Ecology Map Books: Map Series EC-02 and EC-04 to EC-12. Statutory and non-statutory designated sites are shown on Volume 5, Map EC-01-305b to EC-01-309a, more distant designated sites listed in this report are beyond the map extents. The extent of the EC-01 maps is such that some designated sites are identified on them that are not relevant to the assessment due to their distance from the Proposed Scheme. Such sites are not covered in this report.

7.3.2 Land required for construction of the Proposed Scheme and adjacent to the Proposed Scheme in the Risley to Bamfurlong area consists largely of low-lying land under mixed agricultural use with areas of woodland and wet grassland and abundant ponds. The route of the Proposed Scheme will cross several small watercourses and numerous drainage ditches throughout the area. One area of mossland[38] and a series of wetlands and peatlands are major ecological features located across the south of the area. The Risley to Bamfurlong area is within the Great Manchester Wetlands local Nature Improvement Area[39](NIA). The M62 runs east-west at the southern end of the Proposed Scheme in this area.

Designated sites

7.3.3 There is one statutory designated site of international importance of potential relevance to the assessment in the Risley to Bamfurlong area. This is Manchester Mosses SAC, covering an area of 170.5ha and designated for its degraded raised bog still capable of natural regeneration, which is an Annex I Habitat[40]. The SAC includes Holcroft Moss SSSI, Risley Moss SSSI and Astley and Bedford Mosses SSSI, which are described separately below. Holcroft Moss SSSI is located 44m east of the land required for the construction of M62 West viaduct. The intervening land between the land required to construct the viaduct and the boundary of the SSSI has been identified for the purpose of habitat creation or enhancement, as part of the Proposed Scheme. The M62 will be used as a construction traffic route and is situated

[38] A rare habitat consisting of wetland on peat. Lancashire Wildlife Trust, *Restoring our precious peatlands*. Available online at: https://www.lancswt.org.uk/mosslands.

[39] Lancashire Wildlife Trust (2013), *Great Manchester Wetlands*. Available online at: https://www.lancswt.org.uk/greatmanchesterwetlands.

[40] *Directive 92/43/EEC of the European Parliament and of the Council of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Strasbourg, European Parliament and European Council. Annex I of the Directive lists key habitats whose conservation requires the designation of Special Areas of Conservation.

immediately north of the SSSI. A gas main, which is required to be decommissioned as part of the Proposed Scheme, is situated beneath the southern part of Holcroft Moss SSSI. Risley Moss SSSI is located east of Warrington, 520m west of land required for construction of the Proposed Scheme, and Astley and Bedford Mosses SSSI is located south of Leigh 1.6km north-east of land required for construction of the Proposed Scheme in this area.

7.3.4 There are six nationally important SSSI that are of potential relevance to the assessment in the Risley to Bamfurlong area. For each of these sites, land required for construction of the Proposed Scheme in this area is within the Impact Risk Zone[41] relevant to railway infrastructure as identified by Natural England. They are:

- Risley Moss SSSI, covering an area of 85.2ha, of which 60ha is part of the Manchester Mosses SAC. It is designated as one of the last remaining fragments of the raised bog system that once covered large areas of South Lancashire and North Cheshire. Bog mosses are abundant in wet areas, and purple moor grass and heather in drier areas. Round-leaved sundew, bog rosemary, common butterwort and royal fern are present but less frequent. Its location in relation to the Proposed Scheme is reported above within the description of the Manchester Mosses SAC. This SSSI is also relevant to the assessment in the Broomedge to Glazebrook (MA04) area where it is located 1km north-west of land required for the construction of the Proposed Scheme;
- Holcroft Moss SSSI, covering an area of 19.1ha, is a component of the Manchester Mosses SAC. It is designated as the only known uncut area of peat and raised bog remaining in Cheshire. The surface vegetation of the moss is dominated by purple moor-grass with abundant heather, cross-leaved heath and cranberry. Wetter hollows support common cottongrass, deergrass and five species of bog moss. Its location in relation to the Proposed Scheme is reported above within the description of Manchester Mosses SAC;
- Highfield Moss SSSI, covering an area of 21.3ha, is designated for its peatland vegetation, including acid marshy grassland and unimproved acid grassland. The mixed mire communities include common cottongrass, cross-leaved heath and several species of sphagnum. The marshy grassland present is a major stronghold for marsh gentian in the north-west. It is the best remaining example of the raised mires that once covered large areas of lowland in Greater Manchester and Merseyside. The SSSI is located south of Golborne, 1.2km west of land required for construction of the Proposed Scheme;
- Astley and Bedford Mosses SSSI, covering an area of 92.2ha, is a part of Manchester Mosses SAC. It is designated as one of the largest remaining fragments of Chat Moss, a lowland raised mire, most of which has been drained and reclaimed for agriculture or cut over for peat. Mire habitat is dominated by common cottongrass and hare's tail cottongrass. Bog mosses are scarce, but four sphagnum species are present. The site is important for birds, in particular wintering birds of prey such as hen harrier, short-eared

[41] The Impact Risk Zones are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals and indicate the types of development proposal which could potentially have adverse impacts.

owl and merlin, and supports breeding species such as curlew and long-eared owl. Its location in relation to the Proposed Scheme is reported above within the description of Manchester Mosses SAC;

- Abram Flashes SSSI, covering an area of 39.6ha, is designated for its assemblage of breeding birds on lowland open waters, swamp, tall herb fen and wet grassland. The waterfowl assemblage includes tufted duck, pochard, garganey, shoveler, gadwall and ruddy duck. Birds breeding in the SSSI include yellow wagtail, reed bunting, reed warbler, sedge warbler and waders such as lapwing, snipe and redshank. The SSSI is located to the south of Wigan adjacent to the land required for construction of the Proposed Scheme where works to the A573 Wigan Road are required to allow its use as a construction traffic route; and
- Bryn Marsh and Ince Moss SSSI, covering an area of 68.3ha which is designated as the best example of swamp and tall fen vegetation in Greater Manchester and Merseyside, as well as for its important populations of dragonflies and breeding birds. Little and great crested grebe, mute swan, tufted duck, snipe, redshank and reed and sedge warblers breed at the SSSI. It forms an important ornithological link with the other wetlands of the Wigan Flashes. The SSSI is located south of Wigan, adjacent to land required for construction of the Proposed Scheme.

7.3.5 There are five statutory Local Nature Reserves (LNR) that are of potential relevance to the assessment in the Risley to Bamfurlong area, all of which are of county/metropolitan value. They are:

- Risley Moss LNR, covering an area of 82.4ha, is designated as one of the last remaining fragments of the raised peat bog system that once covered large areas of South Lancashire and North Cheshire. It is only one of two examples in Cheshire where the water level has been raised and steps taken to encourage the re-establishment of an active mire system. Part of the larger Risley Moss SSSI (which is a component of the Manchester Mosses SAC) overlaps the LNR boundary. The LNR is located east of Warrington, 520m west of land required for construction of the Proposed Scheme;
- Pennington Flash LNR, covering an area of 91ha, is designated for its ornithological importance. Over 230 bird species have been recorded including wildfowl and notable species such as bittern, little ringed plover, great crested grebe and kingfisher. The LNR is located south of Leigh, 413m from land required for construction of the Proposed Scheme;
- Three Sisters LNR, covering an area of 34ha, is designated for its grassland habitats and its assemblage of woodland and wetland birds that includes willow tit, lapwing and teal. The site is part of a larger complex of wetlands in the Wigan area and is important for education and recreation. The LNR is located west of Abram and 988m from land required for construction of the Proposed Scheme;
- The Wigan Flashes LNR, covering an area of 175ha, is designated for its botanical and ornithological importance. The site has open water, reedbed, fen, grassland and wet woodland habitats and is a wintering site for bittern and other species of wetland birds, with over 200 species recorded. Seventy hectares of the LNR are within Bryn Marsh and

Ince Moss SSSI. It is located adjacent to land required for construction of the Proposed Scheme to the south of Wigan; and

- Low Hall Park LNR, covering an area of 16.5ha, is designated for its open water, swamp, scrub and woodland habitats. The site supports a range of nesting bird species and water vole is regularly recorded. The LNR is located north of Abram and 822m from land required for construction of the Proposed Scheme.

7.3.6 There are four Local Wildlife Sites (LWS) and 10 SBI that are of potential relevance to the assessment in the Risley to Bamfurlong area, each of which is of county/metropolitan value. They are:

- Pestfurlong Moss LWS, covering an area of 4.2ha, is designated for its wet woodland, grassland and fen swamp, bog and reedbed. The LWS is located south of Glazebrook, 62m south of land required for construction of the Proposed Scheme and adjacent to a construction traffic route and land required for utilities diversion works associated with the Proposed Scheme;
- Gorse Covert Mounds LWS and Woodland Trust reserve, covering an area of 19ha, is designated for wet woodland, grassland and scattered ponds and its vascular plants. The habitats support many different invertebrates, most notably dragonfly and damselfly species, for which the site is also designated. It is located south of Glazebrook, partially within land required for construction of the Proposed Scheme, including utilities works involving modification of an overhead power line and construction access;
- Silver Lane Ponds LWS, covering an area of 19ha, is designated for its restorable Biodiversity Action Plan (BAP) grassland and lakes with reedbeds. The site is particularly important for owl species including barn owl and wintering short-eared owl. The site is west of Culcheth, and partially within land required for construction of the Proposed Scheme;
- Eleven Acre Common LWS, covering an area of 4.5ha, is designated for its herb-rich neutral grassland which is likely to qualify as a habitat of principal importance[42] and which supports butterfly species, including gatekeeper and small skipper. The site is west of Culcheth, partially within land required for the construction of the Proposed Scheme, including utilities works involving modification of an overhead power line and diversion of a public footpath;
- Astley and Bedford Mosses SBI, covering an area of 91ha, is designated for its lowland raised bog. The SBI covers the same area as the Astley and Bedford Mosses SSSI. It is located 1.6km east of land required for construction of the Proposed Scheme;

[42] *Natural Environment and Rural Communities Act 2006*, Section 41. London, Her Majesty's Stationery Office. Habitats of principal importance for the conservation of biodiversity in England under Section 41 of the Act, are the habitat most threatened, in greatest decline, or where the UK holds a significant proportion of the world's total population.

- Highfield Moss SBI, covering an area of 19ha, is designated for its heathland, remnant peat mossland and acid grassland. It is located south of Golborne 1.2km west of land required for construction of the Proposed Scheme;
- Pennington Flashes SBI, covering an area of 151ha, is designated for its semi-natural grasslands, reedbed, swamp, fen and standing open water. It is also designated for birds, including species of principal importance[43] such as willow tit, lapwing, reed bunting and grasshopper warbler. Part of the SBI is within Pennington Flash LNR and is located west of Leigh and 101m east of land required for construction of the Proposed Scheme;
- Lightshaw Lime Beds SBI, covering an area of 8.6ha, is designated for its large areas of standing open water, small ponds and former settling ponds, which have a calcareous plant community, and its assemblage of breeding birds, including reed bunting, willow tit and bullfinch. It also supports a population of great crested newt and water vole. The SBI is located north of Golborne, 5m west of land that has been identified for the purpose of habitat creation or enhancement, as part of the Proposed Scheme;
- Ponds Near Lightshaw Lane SBI, covering an area of 11.8ha, is designated for its ponds and associated population of great crested newts, and its assemblages of breeding birds, including reed bunting, shoveler and lapwing. The SBI is located north of Golborne partially within land required for construction of the Proposed Scheme including utilities works involving modification of a water main. It is also partially within land that has been identified for the purpose of habitat creation or enhancement, as part of the Proposed Scheme;
- Abram Flashes SBI, covering an area of 43ha, is designated for its reedbed, swamp and fen and its populations of breeding birds including gadwall, teal and water rail. It is also designated for its winter bird assemblage, which includes black-tailed godwit and curlew. The majority of the SBI is also designated as Abram Flashes SSSI. It is located west of Abram and the northern extent of the SBI is located adjacent to land required for construction of the Proposed Scheme;
- Edge Green Common SBI, covering an area of 4.5ha, is designated for its remnant mossland surrounded by grassland and developing woodland. The mossland habitats are dominated by purple moor-grass. Other species present include heather, sharp flowered rush and bilberry. Four sphagnum moss species are present within the wetter areas. The SBI is located north-west of Edge Green, adjacent to land required for utilities works associated with the construction of the Proposed Scheme;
- Edge Green SBI, covering an area of 1ha, is designated for swamp dominated by common reed. Reed bunting and reed warblers are known to breed in the SBI. The SBI is located north of Edge Green and immediately adjacent to land required for construction of the Proposed Scheme;
- Horrock's Flash SBI, covering an area of 58ha, is designated for its large area of standing water and its populations of butterflies including speckled wood and meadow brown. It is also designated for its assemblage of breeding birds including little ringed plover, willow

[43] *Natural Environment and Rural Communities Act 2006.* Her Majesty's Stationery Office, London.

tit, lapwing, reed bunting and spotted flycatcher and its winter bird assemblage which includes bittern. It is located within the larger Bryn Marsh and Ince Moss SSSI and Wigan Flashes LNR. It is located south of Ince-in-Makerfield and is adjacent to land required for construction of the Proposed Scheme; and

- Bryn Marsh SBI, covering an area of 16ha, is designated for its reedbeds, swamp, fen and standing water and its populations of breeding birds including reed bunting, song thrush, bittern and willow tit. It is also designated for its dragonflies. It is within the larger Bryn Marsh and Ince Moss SSSI and Wigan Flashes LNR. It is located south of Ince-in-Makerfield and is 1km from land required for construction of the Proposed Scheme.

7.3.7 Lightshaw Meadows is a Lancashire Wildlife Trust nature reserve covering an area of 18ha, 13ha of which is within Abram Flashes SSSI. It is designated for its wetland habitats and associated bird assemblage including lapwing, redshank and little ringed plover. It is located west of Abram and adjacent to land required for construction of the Proposed Scheme. The southern section of Lightshaw Meadows (which is not part of the SSSI) is adjacent to a site haul route.

7.3.8 Cadishead and Little Woolden Moss is a Lancashire Wildlife Trust nature reserve covering an area of 115ha. It is designated as one of the last remaining fragments of the Chat Moss peatlands and is currently being restored by Lancashire Wildlife Trust. Hobby and short-eared owl have been recorded at the site. Other species present include brown hare, common lizard and the rare bog bush cricket. *Sphagnum* moss and cottongrass are recolonising Little Woolden Moss. The reserve is located within land that has been identified for the purposes of habitat creation or enhancement, as part of the Proposed Scheme.

7.3.9 The Proposed Scheme will cross the Great Manchester Wetlands local NIA, covering an area of 48,000ha. Whilst not a designated site, locally determined NIAs are identified and agreed by nature partnerships and local planning authorities. The Great Manchester Wetlands local NIA incorporates the wetlands known as the Flashes around Wigan, the Mosslands in the vicinity of Salford and Warrington and the Mersey corridor from Rixton to Warrington. The NIA objectives include improving species dispersal and providing habitat connectivity, optimising the carbon storage capacity of lowland raised bog, and restoring target sites for the delivery of the NIA objectives, which include Gorse Covert Mounds LWS, Silver Lane Ponds LWS and Eleven Acre Common LWS.

7.3.10 There are no ancient woodland inventory (AWI) sites of potential relevance to the assessment in the Risley to Bamfurlong area.

Habitats

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

Woodland

7.3.12 There are 12 areas of lowland deciduous woodland that qualify or are likely to qualify as lowland mixed deciduous woodland, a habitat of principal importance. They are:

- two areas of broadleaved semi-natural woodland at Holcroft Moss SSSI, covering an area of 3.6ha. One is dominated by willow species with species-poor ground flora. The other is dominated by silver birch and the understorey comprises grey willow, hawthorn, holly, young pedunculate oak and rowan. It is comparable to the National Vegetation Classification (NVC) type W16a *Quercus spp.-Betula spp.-Deschampsia flexuosa* woodland, *Quercus robur* sub-community due to the dominance of silver birch and downy birch, but it lacks key indicator species of that community (e.g. wavy hair-grass *Deschampsia flexuosa*). It is located 45m from land required for construction of the Proposed Scheme and adjacent to the M62, which is a construction traffic route for the Proposed Scheme. Both woodland habitats are of county/metropolitan value;
- wet woodland at Gorse Covert Mounds LWS covering an area of 9.3ha. Species include silver birch, goat willow and rowan with a species-poor ground flora. It is partially within land required for construction of the Proposed Scheme and is of county/metropolitan value;
- an area of woodland, known as Woods Near Holcroft Moss, covering 4.9ha and situated either side of the M62. South of the M62 the woodland is adjacent to Holcroft Moss SSSI and consists of grey willow and silver birch with a species-poor ground flora. It is an example of NVC type W1 *Salix cinerea-Galium palustre* woodland. North of the M62 the woodland consists of English elm, young silver birch and grey willow. The ground flora includes elegant silk-moss and rough-stalked feather-moss. The woodland both north and south of the M62 is partially within land required for construction of the Proposed Scheme and is of district/borough value;
- unnamed woodland on the eastern and the south-western edges of Silver Lane Ponds LWS, covering a total area of 1.3ha, partially within and extending south of the LWS. The eastern area consists of wet woodland with frequent semi-mature willow and occasional silver birch and alder. The south-western area consists of ash, elder, alder, hawthorn and pedunculate oak. The woodland is partially within land required for construction of the Proposed Scheme and is of district/borough value;
- a linear woodland covering an area of 8.7ha, at Culcheth Linear Park, and extending from Culcheth to the Liverpool to Manchester (Chat Moss) Line. The woodland comprises abundant semi-mature hawthorn and pedunculate oak with less abundant ash and sycamore. Spindle and small-leaved lime are also present. A very small proportion of the woodland is within land required for construction of the Proposed Scheme, for minor drainage works. The woodland habitat is of county/metropolitan value;
- mature woodland within Eleven Acre Common LWS, covering an area of 1.1ha. The canopy is dominated by mature pedunculate oak and sycamore and a large clonal patch of aspen. The ground flora is species-poor. It is located adjacent to Culcheth Linear Park and partially within land required for utilities works involving modification of an

overhead power line and diversion of Footpath Culcheth and Glazebury 108 associated with the construction of the Proposed Scheme. The woodland habitat is of district/borough value;

- an unnamed linear woodland near Birchalls Farm covering an area of 1.7ha, located along a dismantled railway line from Birchalls Farm to the A580 East Lancashire Road. It is partially within land required for construction of the Proposed Scheme, including utilities works involving modification of a water main. The woodland habitat is of district/borough value;
- Little Covert woodland, covering an area of 3ha, and surrounding a residential dwelling at Kenyon and adjacent to the Liverpool to Manchester (Chat Moss) Line. The canopy is dominated by sycamore and ash, with occasional beech, horse chestnut, pedunculate oak and hazel. It is adjacent to land required for construction of the Proposed Scheme and is of district/borough value;
- a section of Viridor Wood covering an area of 9.2ha, located adjacent and east of the existing West Coast Main Line (WCML), continuing to Abram Flashes SSSI, south-east of Bamfurlong. It is partially within land required for construction of the Proposed Scheme including for utilities works involving removal of an overhead power line. The woodland habitat is of district/borough value;
- unnamed woodland covering an area of 4.3ha, located adjacent and west of the WCML and east of Stubshaw Cross and partially within land required for construction of the Proposed Scheme. The woodland habitat is of district/borough value;
- unnamed wood, covering an area of 8.1ha, is located within Bryn Marsh and Ince Moss SSSI, which is also Wigan Flashes LNR and Horrock's Flash SBI. The woodland consists of predominantly goat willow and grey willow in wetter areas and silver and downy birch in the drier areas. The understorey is sparse, with patches of greater pond sedge. The woodland is located west of Ince-in-Makerfield and is adjacent to land required for construction of the Proposed Scheme. The woodland habitat is of county/metropolitan value; and
- a further 18 areas of woodland (each less than 1.5ha and none within wildlife site designations) totalling approximately 9.9ha, are present throughout the Risley to Bamfurlong area within land required for construction of the Proposed Scheme. These woodland habitats are of up to local/parish value.

7.3.13 There are nine areas of plantation woodland relevant to the assessment. They are:

- unnamed plantation woodland south-west of Silver Lane Ponds LWS, present in two blocks covering an area of 8.9ha and 9.7ha respectively. The woodland canopy is dominated by ash, elder, alder, hawthorn and locally dominant pedunculate oak. The understorey is dominated by Himalayan balsam, with abundant nettle, locally dominant bramble, and rare wood millet. The woodland is likely to qualify as lowland mixed deciduous woodland, a habitat of principal importance. It is located adjacent to and 20m east of land required for construction of the Proposed Scheme and is of district/borough value;

- areas of young plantation woodland, covering a total area of 2.5ha, within Silver Lane Ponds LWS. Species present include oak species, ash, birch species, Scots pine and hawthorn. It is partially within land required for construction of the Proposed Scheme and is of district/borough value;
- mixed plantation woodland within Byrom Wood, covering an area of 19ha. The woodland is a diverse mixture of young to semi-mature trees comprising willow, pedunculate oak, Scot's pine, hawthorn, beech, hazel, silver birch and ash. It is densely planted with little ground flora and contains several scattered water bodies. It is located to the south of Byrom Hall, partially within land required for construction of the Proposed Scheme including utilities works involving modification of a water main and overhead power line. It is of district/borough value;
- an unnamed plantation woodland, covering an area of 2.3ha. The woodland consists of abundant oak species and frequent ash and willow species of uniform age and height. No understorey and a sparse ground flora are present comprising grass and ruderal species. It is located adjacent to Windy Bank Brook, and partially within land required for construction of the Proposed Scheme, including utilities works involving the modification of overhead power lines. It is of local/parish value;
- a section of Viridor Wood, a Forestry Commission managed wood, covering 5.7ha and consisting of a mixed plantation woodland. It is located south-east of Bryn Gates, adjacent to the WCML and to land required for the construction of the Proposed Scheme. The woodland is of local/parish value; and
- an area of plantation woodland, adjacent to Woods Near Holcroft Moss and south of the M62, covering 2.1ha. The woodland is partially within land required for construction of the Proposed Scheme and is of local/parish value.

7.3.14 There are three plantation woodlands (each less than 1.5ha and none within wildlife site designations) relevant to the assessment totalling approximately 3.4ha present throughout the Risley to Bamfurlong area within land required for construction of the Proposed Scheme. These woodland habitats are of up to local/parish value.

Grassland

7.3.15 A mixture of marshy and drier semi-improved grassland, covering an area of 7.3ha is present within Silver Lane Ponds LWS. The marshy grassland contains abundant soft rush and frequent reed canary-grass with common bird's-foot-trefoil, common fleabane, jointed rush, meadowsweet, red fescue, and horsetail species. The habitat is characteristic of NVC MG10a *Holcus lanatus-Juncus effusus* grassland typical sub-community, with sub-community S28b *Phalaris arundinacea* tall-herb fen, *Epilobium hirsutum-Urtica dioica* sub-community in places. Relatively diverse marshy unimproved vegetation, broadly referable to NVC type M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, is also present. These habitats qualify as a conservation priority of the local BAP. The grassland is partially located within land required for construction of the Proposed Scheme and is of county/metropolitan value.

7.3.16 Semi-improved neutral grassland, covering an area of 1.8ha is present within Gorse Covert Mounds LWS. The majority of the grassland consists of sown wildflower species, including devil's-bit scabious. There are records of grass vetchling and northern marsh orchid being present. Small patches within the grassland are referable to MG5 *Cynosurus cristatus - Centaurea nigra* grassland, which qualifies as a habitat of principal importance and is a conservation priority of the local BAP. It is located north of Gorse Covert, adjacent to the M62 and to land required for construction of the Proposed Scheme. The grassland is of county/metropolitan value.

7.3.17 Species-rich semi-improved neutral grassland, covering an area of 2.1ha is present within Eleven Acre Common LWS. The grassland is dominated by false oat-grass, common bent, cock's-foot and Yorkshire fog. Common knapweed and tufted vetch are both abundant, and sneezewort, meadow vetchling, hogweed, field horsetail and bush vetch are frequent. This habitat is a conservation priority of the local BAP. The grassland is located west of Culcheth adjacent to land required for construction of the Proposed Scheme and is of county/metropolitan value.

7.3.18 Species-rich marshy grassland, covering an area of 0.8ha is present within Abram Flashes SSSI. Soft rush, marsh bedstraw and reed canary grass are present throughout. Soft rush, reed canary-grass, water mint, field forget-me-not, rough meadow-grass, meadowsweet and common valerian are also present. The grassland is a mosaic of M23b *Juncus effusus/acutiflorus-Galium palustre* rush pasture, *Juncus effusus* sub-community and S28a *Phalaris arundinacea* tall-herb fen, *Phalaris arundinacea* sub-community. This habitat qualifies as a habitat of principal importance and is a conservation priority of the local BAP. It is a component of a mosaic of habitats which resemble lowland fen. The grassland is located 40m from land required for construction of the Proposed Scheme and of is county/metropolitan value.

7.3.19 Semi-improved neutral grassland and marshy grassland covering an area of 0.2ha and 0.9ha respectively is present at Lightshaw Lime Beds SBI. Species present include great willowherb, water horsetail, hemp agrimony, bulrush and marsh ragwort. There are also areas of calcareous species including glaucous sedge, devil's-bit scabious, marsh orchid, meadow vetchling, knapweed and common centaury. The grassland may qualify as a habitat of principal importance and is a conservation priority of the local BAP. It is adjacent to land required for construction of the Proposed Scheme. It is of county/metropolitan value.

7.3.20 Unimproved, semi-improved grassland and poor semi-improved grassland covering an area of 6.4ha is present within Ponds Near Lightshaw Lane SBI. Species present include red fescue, sorrel, meadow buttercup, wild angelica, Yorkshire fog, false-oat grass, soft rush, black knapweed, tufted vetch and greater birds-foot trefoil. The unimproved grassland is considered a weak match to NVC type MG1e *Arrhenatherum elatius* grassland, *Centaurea nigra* sub-community. This habitat is a conservation priority of the local BAP. It is within land required for construction of the Proposed Scheme including areas required for habitat creation and enhancement and is of county/metropolitan value.

7.3.21 Semi-improved neutral grassland covering an area of 1ha is present adjacent to Slag Lane north-east of Golborne. Species present include smooth meadow grass, cock's-foot, perennial rye-grass, common knapweed, Yorkshire fog and greater plantain and occasionally sweet vernal-grass, crested dog's tail, bush vetch, common mouse ear, tufted vetch and marsh thistle. The grassland is located within land required for construction of the Proposed Scheme. It is of district/borough value.

7.3.22 Semi-improved neutral grassland covering an area of 2.4ha is located north-east of Golborne. The grassland consists of Yorkshire fog and occasional common bent, crested dog's tail and soft rush. Occasional ribwort plantain, red clover, meadow buttercup and creeping buttercup are present. Red bartsia, common ragwort, petty spurge, wood dock, meadow vetchling and common bird's-foot-trefoil are also present but rarely. The grassland is located north-east of Golborne, partially within land required for construction of the Proposed Scheme. It is of district/borough value.

7.3.23 Species-poor semi-improved grassland and species-poor marshy grassland covering areas of 71ha and 16ha respectively are present throughout the Risley to Bamfurlong area within land required for construction of the Proposed Scheme. Areas of species-poor semi-improved grassland and species-poor marshy grassland are of local/parish value.

Hedgerows

7.3.24 In total, there is 41.9km of hedgerow within the land required for construction of the Proposed Scheme in the Risley to Bamfurlong area. Hedgerow with at least 80% cover of native woody species is a habitat of principal importance.

7.3.25 Of the 41.9km of hedgerow, 31.3km have not been surveyed. To accord with Phase 1 Habitat descriptions these are mapped as native species-rich on map series EC-02 and they are included as native species-rich in the list below. Based on survey data, and on a precautionary basis, the hedgerows are assumed to consist of:

- 9.5km of native species-poor hedgerow; and
- 32.4km of native species-rich, of which 1.1km are also classified as 'Important' according to the 'Wildlife and Landscape' criteria described in The Hedgerows Regulations 1997[44].

7.3.26 As part of the precautionary assessment, it is assumed that further important hedgerows will be found within land that was not surveyed, but which will be required for the Proposed Scheme. The hedgerows within the area also function as wildlife corridors. The hedgerow network as a whole is of country/metropolitan value.

Watercourses

7.3.27 Carr Brook, Small Brook, Hey Brook, Windy Bank Brook, Nan Holes Brook and Coffin Lane Brook will be crossed by the route of the Proposed Scheme. Carr Brook, Windy Bank Brook,

[44] *The Hedgerow Regulations 1997.* (SI 1997 No. 1160), Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/uksi/1997/1160/made.

Nan Holes Brook and Coffin Lane Brook may qualify as habitats of principal importance and local BAP habitats. These watercourses and adjacent habitats are intrinsically important and provide corridors for wildlife dispersal, as such they are of up to county/metropolitan value.

7.3.28 Several smaller watercourses, including tributaries of Holcroft Lane Brook and Hey Brook will also be crossed by the route of the Proposed Scheme. These smaller watercourses are of up to district/borough value. The unnamed tributaries of these smaller watercourses are of up to local/parish value.

Water bodies

7.3.29 There are 60 ponds located within, or partly within, land required for construction of the Proposed Scheme, and a further 115 ponds within 250m of the land required for construction of the Proposed Scheme. On a precautionary basis it is assumed that all ponds could support habitats of principal importance or local BAP habitats and are of district/borough value unless surveys have shown that they are of local/parish value only.

Lowland raised bog

7.3.30 Lowland raised bog, covering an area of 11.8ha is present within Holcroft Moss SSSI. Purple moor grass is the dominant species with sphagnum moss species present throughout and soft rush occasionally present. The habitat is referrable to M17a *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire-*Drosera rotundifolia Sphagnum* spp. sub-community due to the constant frequencies of common heather, purple moor-grass, cross-leaved heath, papillose bog-moss and common cottongrass. It is located 44m from the land required for the construction of the Proposed Scheme. This area is a habitat of principal importance and a conservation priority of the local BAP and is of international value.

7.3.31 Lowland raised bog, covering an area of at least 10ha is present within Bryn Marsh and Ince Moss SSSI, which includes Wigan Flashes LNR and Horrocks Flash SBI. This is a habitat of principal importance and a conservation priority of the local BAP. It is located 50m from land required for construction of the Proposed Scheme and is of national value.

7.3.32 Lowland raised bog, covering an area of 3.1ha is present within Pestfurlong Moss LWS, south-east of junction 11 of the M62. This is a lowland raised peat bog remnant which is undergoing succession with open areas dominated by purple moor-grass and remnant heather and bog mosses. This is a habitat of principal importance and a conservation priority of the local BAP. It is located south of Glazebrook, 62m south of land required for construction of the Proposed Scheme and adjacent to a construction traffic route and land required for utilities diversion. It is of county/metropolitan value.

7.3.33 Degraded raised bog habitat, covering an area of 115ha is present within Cadishead and Little Woolden Moss Lancashire Wildlife Trust nature reserve. This is a habitat of principal importance and a conservation priority of the local BAP. The reserve is located within land required for the Proposed Scheme for the purposes of habitat creation and enhancement, north-east of Holcroft Moss SSSI, 861m from the land required for construction of the Proposed Scheme and is of regional value.

Swamp

7.3.34 Swamp and reedbed covering an area of 3.7ha is present within Abram Flashes SSSI and SBI. This includes at least four different NVC communities including areas of swamp dominated by reed canary-grass, referable to:

- S28b *Phalaris arundinacea* tall-herb fen *Epilobium hirsutum Urtica dioica* sub-community;
- M23b *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, *Juncus effusus* sub-community;
- water horsetail swamp S10a *Equisetum fluviatile* swamp, *Equisetum fluviatile* sub-community;
- bur-reed swamp S14c *Sparganium erectum* swamp, *Mentha aquatica* sub-community; and
- a dense homogenous area of common reed within a field of improved grassland where a pond has dried. This habitat is a habitat of principal importance and is a conservation priority of the local BAP.

7.3.35 The habitat is located adjacent to land required for construction of the Proposed Scheme and is of national value.

Lowland fen

7.3.36 Two areas of lowland fen that are likely to quality as a habitat of principal importance and are a conservation priority of the local BAP are present adjacent to the land required for the construction of the Proposed Scheme. They are:

- an area of 1.5ha present within Lightshaw Lime Beds SBI, is recorded on Natural England's Priority Habitats Inventory but with low confidence in this classification, and the site has not been surveyed for this assessment. The fen is located adjacent to land required for the Proposed Scheme for the purposes of habitat creation and enhancement and is of county/metropolitan value; and
- a range of habitats, often in mosaic, covering an area of 12.75ha are present within Abram Flashes SSSI and SBI that together resemble lowland fen. These include swamp habitats dominated by water horsetail, reed canary-grass and bulrush indicated as swamp above. There are also areas of scrub dominated by grey willow and marshy grassland with abundant soft rush. Drier areas support poor semi-improved grassland dominated by false oat-grass. The fen is located adjacent to land required for the Proposed Scheme and is of national value.

Protected and/or notable species

7.3.37 A summary of the likely value of protected and/or notable species of relevance to the assessment is provided in Table 15.

Table 15: Protected and/or notable species within the Risley to Bamfurlong area

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Terrestrial invertebrates	National	Invertebrate assemblages at Holcroft Moss SSSI	An assemblage of 137 species was recorded during surveys, including bog-bush cricket, a species associated with lowland bog habitat which is nationally scarce and a species of conservation concern. Records in the desk study included: two crane flies, *Tanyptera nigricornis* and *Tipula helvola,* respectively nationally notable and rare; and two jumping spiders, *Sibianor larae* and *Heliophanus dampfi,* of which the former is a new record for the UK and has not yet been given a conservation status and the latter is nationally rare. There was also a record for a fungus gnat *Keroplatus testaceus*, which is nationally scarce.
Terrestrial invertebrates	Up to county/ metropolitan	Invertebrate assemblage at Risley Moss SSSI and LNR	The desk study indicated records of two water beetles, *Acilius canaliculatus* and *Haliplus (Haliplinus) apicalis* and the marsh oblique-barred moth, which are all nationally scarce. The desk study also identified records of a nationally rare rove beetle *Tachinus rufipennis*, and a longhorn beetle *Pyrrhidium sanguineum*, which is a red data book species.
Terrestrial invertebrates	Up to district/ borough	Invertebrate assemblage at Highfield Moss SSSI	The desk study indicated records of three spiders *Hahnia pusilla, Hypselistes jacksonii* and *Taranucnus setosus*, which are all nationally scarce, at Highfield Moss SSSI.
Terrestrial invertebrates	District/ borough	Invertebrate assemblage at dismantled railway line near Birchalls Farm	An assemblage of 117 invertebrate species was recorded during field surveys including *Gimnomera tarsea*, a scathophagid fly which is a nationally notable species associated with peatland habitat.
Bats	Regional	Bat assemblage between the M62 and Culcheth Linear Park	Field surveys confirmed the presence of common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Daubenton's bat, Natterer's bat, whiskered/ Brandt's bat and other *Myotis* species, noctule, Leisler's bat and brown long-eared bats within this assemblage: • occasional roosts of common pipistrelle, soprano pipistrelle, *Pipistrellus* species and *Myotis* species occasional roosts; and • high levels of brown long-eared bat, *Pipistrellus* species and *Myotis* species activity at Silver Lane Ponds LWS and Culcheth Linear Park indicate these are key foraging and commuting areas. The assemblage is considered to be of regional value on the basis that high levels of *Myotis* species and noctule were recorded, which are considered to be 'rarer' species in England.[45]

[45] Wray S, Wells D, Long E and Mitchell-Jones T (2010), *Valuing Bats in Ecological Impact Assessment*, IEEM In-Practice p 23-25.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Bats	Regional	Bat assemblage at Abram and Pennington Flashes	Field surveys confirmed the presence of common pipistrelle, soprano pipistrelle, *Myotis* species, noctule, Leisler's bat, serotine, brown long-eared, Daubenton's bat and Nathusius' pipistrelle bats within this assemblage: • occasional roosts of common pipistrelle and soprano pipistrelle; • a common pipistrelle possible maternity roost was recorded in a residential building at A573 Wigan Road, Stubshaw Cross, 30m east of land required for the construction of the Proposed Scheme; • high levels of foraging bats at Byrom Wood, including *Myotis* species and noctule, indicate that this is a key foraging area; and • Viridor Wood is considered to be a key foraging area due to consistently high numbers of bats recorded. Maternity roosts, including those of the most common species, are relatively uncommon and are important in maintaining bat populations. The assemblage is considered to be of regional value on the basis that maternity roosts are present and high levels of serotine, *Myotis* species including Leisler's bat, and noctule were recorded, which are considered to be 'rarer' species in England.
Bats	Up to regional	Bat assemblage at Lowton	Field surveys confirmed the presence of common pipistrelle, soprano pipistrelle, noctule, *Myotis* species, Daubenton's bat, brown long-eared bat, Leisler's bat and Nathusius' pipistrelle bats within this assemblage: • occasional roosts of soprano pipistrelle, pipistrelle species, common pipistrelle and brown long-eared; and • high levels of soprano pipistrelle, brown long-eared, noctule and Leisler's bats recorded along Slag Lane indicate that a significant roost could be located nearby and that it is a key commuting corridor, probably linking foraging habitats at Pennington Flash and Byrom wood. Taking a precautionary approach, the assemblage is considered to be of up to regional value, because the survey results indicate a significant roost of Leisler's bat and noctules could be within the assemblage, which are considered to be 'rarer' species in England.
Bats	County/ metropolitan	Bat assemblage between woodland south of Holcroft Moss to the M62 in the Broomedge to Glazebrook area and the Risley to Bamfurlong area (MA04).	Field surveys confirmed the presence of common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, *Pipistrellus* species, brown long-eared bat, noctule, Leisler's bat, Daubenton's bat, and *Myotis* species within this assemblage: • occasional roost of common pipistrelle and brown long-eared bat within the Broomedge to Glazebrook area (MA04); • low to moderate levels of common pipistrelle and soprano pipistrelle activity; • low to moderate levels of noctule activity; and • low levels of *Myotis* species activity. The assemblage is considered to be of county/metropolitan value on the basis that low numbers of *Myotis* species and noctule were recorded, which are considered to be 'rarer' species in England.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Birds	County/ metropolitan	Breeding bird assemblage at Holcroft Moss to Hole Mill Farm, north of disused peat workings	Forty-seven bird species, including 23 notable species, were recorded during field surveys, both within and adjacent to land required for construction of the Proposed Scheme. Breeding territories of 29 species were recorded, of which eight species are of principal importance and/or conservation priorities of the local BAP[46]. The desk study identified 22 additional notable species including hobby and kingfisher. The breeding bird assemblage is of county/metropolitan value due to the presence of 14 species important in Cheshire and five Red List species including species which use mossland habitats, including two species which are rare and scarce in Cheshire; curlew and snipe[47].
Birds	County/ metropolitan	Breeding bird assemblage at Pestfurlong to Culcheth	A total of 59 bird species, including 28 notable species were recorded during field surveys, within and adjacent to land required for construction of the Proposed Scheme. Habitats surveyed were of a typical agricultural landscape. Breeding territories of 25 species were recorded comprising six species of principal importance and/or conservation priorities of the local BAP and four Red List species. The breeding bird assemblage is of county/metropolitan value as it includes 10 breeding species important in Cheshire including little ringed plover, which is a Schedule 1 species and rare in Cheshire.
Birds	County/ metropolitan	Wintering short-eared owl at Silver Lane Ponds LWS and Ponds Near Lightshaw Lane SBI	The desk study identified short-eared owl at Silver Lane Ponds LWS which provides suitable foraging habitat for this species and is partly within land required for construction of the Proposed Scheme. A short-eared owl was observed at land adjacent to Ponds Near Lightshaw Lane SBI during field surveys. Short-eared owl is an Annex 1 species[48].
Birds	County/ metropolitan	Willow tit throughout the Risley to Bamfurlong area	Records of willow tit throughout the Risley to Bamfurlong area, including Lowton, Abram Flashes, Risley Moss and Holcroft Moss were identified in the desk study. A willow tit was identified during field surveys in the Bamfurlong area and a possible willow tit was identified at Ince Moss. Willow tit is a species of principal importance, rare in Cheshire and a conservation priority of the local BAP and Great Manchester Wetlands local NIA.

[46] Cheshire Wildlife Trust (2011), *Cheshire Region Biodiversity Action Plan*. Available online at: https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/BAP%20list%20-%20updated%20April%202011.pdf.

[47] Cheshire Wildlife Trust (2014), *Local Wildlife Site Selection Criteria for the Cheshire region*. Available online at: https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Cheshire%20LWS%20selection%20criteria.pdf.

[48] Annex I species listed on the Birds Directive are those in danger of extinction; vulnerable to specific changes in their habitat; considered rare and for which Special Protection Areas are designated.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Birds	Up to country/ metropolitan	Potential barn owl populations between Culcheth and Bamfurlong	Records of barn owl, associated with Silver Lane Ponds LWS, Culcheth and Bryn Gates, were identified in the desk study. A nest box is present at Slag Lane, adjacent to the land required for the construction of the Proposed Scheme, and barn owls were reported as breeding in 2018 by the landowner. Suitable foraging habitat for barn owl was identified during field surveys throughout the Risley to Bamfurlong area. Barn owl is a conservation priority of the local BAP and a Schedule 1 species.
Birds	District/ borough	Breeding bird assemblage at Golborne to Bamfurlong	A total of 66 bird species, including 35 notable species were recorded during field surveys, within and adjacent to land required for construction of the Proposed Scheme. Breeding territories of 33 species were recorded, of which 13 are notable, with seven Red List species. The desk study identified 20 additional notable species including hobby and kingfisher. The breeding bird assemblage is of district/borough importance due to the presence of 14 breeding species important in Cheshire and eight species of principal importance and/or conservation priorities of the local BAP[49].
Birds	District/ Borough	Winter bird assemblage at Pestfurlong to Culcheth	A total of 35 bird species, including 14 notable species with seven red list species, were identified during field surveys, both within and adjacent to land required for construction of the Proposed Scheme. This diverse assemblage of wintering species includes five species of principal importance and/or conservation priorities of the local BAP. It includes three species that are rare and scarce in Cheshire: pochard, snipe and corn bunting. These species were only recorded on single occasions.
Birds	Local/parish	Winter bird assemblage at Golborne to Bamfurlong	A total of 37 bird species, including 15 notable species were recorded during field surveys, both within and adjacent to land required for construction of the Proposed Scheme. The winter bird assemblage comprises five species of principal importance and/or conservation priorities of the local BAP[49].
Birds	Local/parish	Winter bird assemblage at Windy Bank to A58 Lily Lane	A total of 64 bird species, including 31 notable species with 12 red list species, were recorded during field surveys, both within and adjacent to land required for construction of the Proposed Scheme. The winter bird assemblage comprises 10 species of principal importance and/or conservation priorities of the local BAP.

[49] Greater Manchester Ecology Unit (2009), *Greater Manchester Biodiversity Action Plan*. Available online at: https://www.gmwildlife.org.uk/projects/gm_bap/.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Amphibians	Up to county/ metropolitan	A metapopulation (a group of at least four spatially separated populations which interact)[50] (GCNMP1.5.2) of great crested newt in a network of 15 ponds south of Culcheth	An assumed (due to the presence of unsurveyed ponds) medium metapopulation of great crested newt was identified across 15 ponds, which includes a positive eDNA survey result from one pond. These ponds are distributed within, to over 500m from the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	A metapopulation (GCNMP1.5.3) of great crested newt in a network of seven ponds south-east of Culcheth	An assumed medium metapopulation of great crested newt was identified across seven ponds, which includes positive eDNA survey results from three ponds. These ponds lie from 180m to over 500m from the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	A metapopulation (GCNMP1.5.4) of great crested newt in a network of 29 ponds west of Culcheth	A medium metapopulation of great crested newt was identified across 29 ponds. Field surveys recorded small populations in four ponds and medium populations in two ponds. Great crested newt DNA was also recorded in eight ponds. These ponds lie partially within to over 500m from the land required for the construction of the Proposed Scheme.
Amphibians	County/ metropolitan	A population (GCNP1.5.6) of great crested newt in a network of three ponds north-west of Culcheth	An assumed medium population of great crested newt was identified across three ponds, which includes a positive eDNA survey result from one pond. These ponds are distributed between 292m and 500m from the land required for the construction of the Proposed Scheme.

[50] Each great crested newt meta-population (GCNMP) has been given an identifying number. Meta-populations are described in BID EC-007-00001 Ecological baseline data - amphibian and pond and canal surveys.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Amphibians	County/ metropolitan	A population (GCNP1.5.10) of great crested newt in a network of three ponds south-east of Golborne	An assumed medium population of great crested newt was identified across three ponds due to a positive eDNA survey in one pond. The ponds are situated between 104m to 250m from the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	A population (GCNMP1.5.11) of great crested newt in one pond south-east of Golborne	A medium population of great crested newt was identified within a single pond through field surveys. The pond lies within the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	An assumed metapopulation (GCNMP1.5.12) of great crested newt in a network of six ponds south-east of Golborne	An assumed medium metapopulation of great crested newt was identified across six ponds due to confirmed presence from desk study records in three ponds. These ponds lie between 29m and to over 500m from the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	An assumed population (GCNMP1.5.13) of great crested newt in one pond south-east of Golborne	An assumed medium population of great crested newt was identified in one pond due to confirmed presence from a desk study record. This pond lies 133m from the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	An assumed metapopulation (GCNMP1.5.14) of great crested newt in a network of 18 ponds south-east of Golborne	An assumed medium metapopulation of great crested newt was identified across 18 ponds. Field surveys recorded a small population in one pond and an assumed medium population in one pond. These ponds lie within and to over 500m from the land required for the construction of the Proposed Scheme.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Amphibians	County/ metropolitan	An assumed metapopulation (GCNMP1.5.15) of great crested newt in a network of 47 ponds north-east of Golborne	An assumed medium metapopulation of great crested newt was identified in 47 ponds. Field surveys recorded a small population in two ponds and an assumed medium population in one pond. Desk study records identified populations in seven ponds and a positive eDNA result was recorded in one pond. The ponds lie within and up to over 500m from the land required for the construction of the Proposed Scheme.
Amphibians	Up to county/ metropolitan	Populations of great crested newt within un-surveyed ponds	Ponds that have not been surveyed are assumed to support breeding populations of great crested newt of medium size class.
Amphibians	Local/parish	Populations of other amphibian species comprising palmate newt, smooth newt, common toad and common frog.	These common amphibian species have been identified within ponds throughout the Broomedge to Glazebrook area during surveys and are assumed to be present within the ponds that have not been surveyed. Woodland, rough grassland and hedgerow habitats are likely to be utilised by these species during their terrestrial phase for foraging, dispersal and shelter. Each of these species is common and widespread throughout the UK. Common toad is a species of principal importance.
Water vole	Up to County/ metropolitan	Water vole population at Hey Brook	Possible evidence of water vole was recorded during field surveys including a low number of burrows, footprints and runs. There is a single desk study record near Hey Brook adjacent to Abram Flashes 222m east of land required for construction of the Proposed Scheme. Whilst presence of water vole has not been confirmed, on a precautionary basis water vole are considered to be present at low densities along Hey Brook. Water vole is a species of principal importance and a conservation priority of the local BAP[51]. Water vole populations are widespread and locally common in Greater Manchester, although populations are often fragmented and susceptible to local extinctions. Water vole numbers have reduced significantly in the past 30 years.

[51] Cheshire Wildlife Trust (2006), *Water Vole Local Biodiversity Action Plan*. Available online at: https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Water%20vole.pdf.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Water vole	Up to county/ metropolitan	Low density population at Holcroft Lane Brook	No evidence of water vole was recorded during field surveys. There are historical records of water vole on tributaries of Holcroft Lane Brook, at the restored Risley Landfill. This includes records of possible burrows and sightings of eight adult water voles within the land required for the construction of the Proposed Scheme. Taking a precautionary approach, given the historical presence of water vole, a low-density population has been assumed to be present. Water vole is a species of principal importance and a conservation priority of the local BAP. Water vole are widespread and locally common in the Cheshire area, although numbers have reduced significantly in the past 30 years.
Water vole	Up to county/ metropolitan	Population at Silver Lane Ponds LWS	No surveys have been carried out at this location, but the desk study data included records of five adult water vole within the land required for the construction of the Proposed Scheme. Taking a precautionary approach, given the historical presence of water vole, a low-density population has been assumed to be present.
Water vole	Up to county/ metropolitan	Low density population at Hey Brook and tributaries 1 to 6	Field surveys returned scattered evidence of water vole, including possible burrows, feeding signs and footprints 173m east of the land required for the construction of the Proposed Scheme (Tributary of Hey Brook 6). Whilst presence of water vole has not been confirmed, on a precautionary basis water vole are assumed to be present at low densities within the complex of watercourses as part of a wider metapopulation.
Reptiles	County/ metropolitan	A population of common lizards at Holcroft Moss	Common lizard was recorded in low numbers during field surveys at Holcroft Moss SSSI, and there are also records in the desk study at this site. Common lizard is a species of principal importance and is rare in Cheshire.
Reptiles	Up to local/ parish	Potential small populations of reptiles in the Risley to Bamfurlong area	Other than common lizards, no reptiles were found during field surveys at the five sites that were surveyed, or at two further sites that were partially surveyed, where five visits (rather than seven) were completed. Potentially suitable but un-surveyed habitats were largely constrained to field boundaries of close grazed pasture and arable fields, which are not considered suitable to support a widespread population of reptiles. However, there is potential for isolated populations in areas associated with the meres and mosses or, to a lesser extent, other semi-natural habitat. Grass snake, slow worm and common lizard are all species of principal importance.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Otter	District/ borough	Population of otter using watercourses in the Risley to Bamfurlong area	Suitable breeding habitat was recorded at Nan Holes Brook, Hey Brook and the Leeds and Liverpool Canal. Breeding is considered unlikely in these locations, but it is considered that otter will make use of these watercourses for foraging and dispersal. Desk study data provided no records of otter presence. Otters are re-colonising Greater Manchester and Cheshire but the population in Cheshire is lower than would be expected compared with the availability of suitable habitat[52]. Otter is an Annex 2 species[53], a species of principal importance and a conservation priority of the local BAP.
Aquatic macro-invertebrates	District/ borough	Aquatic macro-invertebrate assemblage in Small Brook, Lowton Common	The aquatic macro-invertebrate field surveys recorded 396 individual specimens from 34 taxa in spring, with a Community Conservation Index (CCI) score indicating that the macro-invertebrate assemblage was of 'moderate' conservation value. The field surveys recorded 1,180 individual specimens from 18 taxa in autumn, with a CCI score of 'moderate' conservation value with a 'bad' WFD quality class. A variety of taxa were recorded, including snails, mussels, worms, leeches, crustacea, mayfly and true bugs. Small Brook is adjacent to land required for construction of the Proposed Scheme.
Aquatic macro-invertebrates	District/ borough	Aquatic macro-invertebrate assemblage in Nan Holes Brook, north of Golborne	The aquatic macro-invertebrate field surveys recorded 1,083 individual specimens from 28 taxa in spring, with a CCI score indicating that the macro-invertebrate assemblage was of 'low' conservation value. The field surveys recorded 110 individual specimens from 25 taxa in autumn, with a CCI score of 'fairly high' conservation value with a 'poor' WFD quality class. A variety of taxa are present, including the black fly *Simulium aureum*, which has a conservation score of five, and indicates that there may be regionally notable or locally important species present. Water beetles, mussels, worms, crustacea, mayfly, caddisflies, leeches and true flies were also present. Nan Holes Brook will be crossed by the Proposed Scheme.
Aquatic macro-invertebrates	District/ borough	Aquatic macro-invertebrate assemblage in Coffin Lane Brook, north of Golborne	The aquatic macro-invertebrate field surveys recorded 763 individual specimens from 17 taxa in spring, with a CCI score indicating that the macro-invertebrate assemblage was of 'low' conservation value. The field surveys recorded 393 individual specimens from 20 taxa in autumn, with a CCI score of 'moderate' conservation value with a 'poor' WFD quality class. A variety of taxa are present, including the black fly *Simulium aureum*, which has a conservation score of five, and indicated that there may be regionally notable or locally important species present. Water beetles, mussels, worms, crustacea, mayfly, caddisflies, leeches and true flies are also present. Coffin Lane Brook will be crossed by the Proposed Scheme.

[52] Cheshire Wildlife Trust (2018), *Otter Local Biodiversity Action Plan*. Available online at: https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Otter.pdf.

[53] Animal and plant species of community interest whose conservation requires the designation of special areas of conservation.

Resource/ feature	Value	Receptor	Baseline and rationale for valuation
Fish	District/ borough	Fish assemblage in Hey Brook	Chub, perch, European eel and three-spined stickleback were identified during field surveys undertaken at Hey Brook. Gudgeon, pike and tench were also recorded in Hey Brook from the Environment Agency monitoring data in the desk study, which also identified roach and stone loach as being present. Tributaries 1-6 of Hey Brook will be crossed by the route of the Proposed Scheme and it is assumed that these species are present. European eel is a species of principal importance. It is widespread in suitable habitat in England.
Fish	Local/parish	Fish assemblage in Carr Brook	Stone loach and three-spined stickleback were identified during field surveys undertaken at Carr Brook, which will be crossed by the route of the Proposed Scheme.
Badger	Local/parish	Population of badgers at an undisclosed location in the Risley to Bamfurlong area	No main badger setts were recorded within land required for construction of the Proposed Scheme during field surveys. There is suitable habitat for badger throughout land required for construction of the Proposed Scheme within pasture, arable and woodland habitat. One disused main sett with 11 entrances was identified during field surveys 19m north of land required for construction of the Proposed Scheme. One outlier badger sett with one inactive entrance was identified during field surveys 11m west of land required for construction of the Proposed Scheme. The desk study identified setts at two locations over 1km from land required for construction of the Proposed Scheme.

Future baseline

Construction (2025)

7.3.38 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. No committed developments of relevance for ecology and biodiversity have been identified that would materially alter the future baseline in this area.

Operation (2038)

7.3.39 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No committed developments of relevance for ecology and biodiversity have been identified that would materially alter the future baseline in this area.

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 (additional to the landscape planting as shown on the Map Series CT-06 along the route of the Proposed Scheme, which will be largely a mixture of woodland/scrub and grassland), and contribute towards limiting effects on habitats and species:

- decommissioning of the existing gas main within Holcroft Moss will involve the use of a suitable fill material and will be carried out without physical disturbance to the raised bog habitat and therefore will avoid adverse effects to the SAC/SSSI. This has been agreed with Natural England;
- M62 West viaduct, 728m in length in this area and up to 11m in height with spans of 40m, which will be situated 44m west of Holcroft Moss SSSI. This design will minimise potential reduction in groundwater flows that maintain the integrity of raised bog habitat at the SSSI;
- reduction in the land required for construction of the Proposed Scheme within woodland adjacent to the M62, reducing the loss of woodland at Woods near Holcroft Moss;
- reduction in the land required for construction of the Proposed Scheme within Silver Lane Ponds LWS, reducing the loss of grassland and loss of water bodies within this LWS;
- reduction in the land required for construction of the Proposed Scheme at Lowton, reducing the loss of semi-improved grassland, trees and hedgerows;
- discharge of drainage water from the Proposed Scheme into Coffin Lane Brook to compensate for any potential reduction in groundwater flows to Abram Flashes SSSI;
- reduction in the land required for construction of the Proposed Scheme adjacent to Windy Bank Farm, reducing impacts on Windy Bank Brook and the loss of woodland; and

- Slag Lane viaduct, 44m in length will maintain ecological connectivity under the route of the Proposed Scheme and along Slag Lane, a key commuting corridor for the bat assemblage at Lowton.

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice[54] (CoCP), which includes sensitive construction practices and habitat management plans.

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;
- 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 Effects arising during construction that are significant at the district/borough level or above are described below. Effects on ecological features of significance at the local/parish level are listed in Volume 5: Appendix: EC-015-0MA05.

Designated sites

7.4.5 A study to inform an HRA Screening Report was undertaken for the Manchester Mosses SAC during the Appraisal of Sustainability stage of the Proposed Scheme. This was undertaken in consultation with Natural England and the Environment Agency. The HRA Screening Report concluded that there was a potential significant effect on the SAC due to changes in the hydrological regime of the site. However, the report also concluded that this effect could be addressed through appropriate viaduct design in the vicinity of the site to retain groundwater movements to the SAC. Updated documents to inform the Appropriate Assessment for hybrid Bill design have been completed as set out in Volume 5: Appendix EC-

[54] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

016-00002. The documents to inform the Appropriate Assessment concludes that there will be no adverse effects on the SAC from construction of the Proposed Scheme, either alone or in combination with other projects and plans, for the following reasons:

- there will be no adverse effects on the integrity of the raised bog habitat at Holcroft Moss SSSI from decommissioning of a gas main, which will remain in-situ beneath the site;
- the design of M62 West viaduct, together with a groundwater recharge trench (located south of Holcroft Moss SSSI in the Broomedge to Glazebrook area (MA04)) to convey groundwater to the site at the northern end of Glazebrook North embankment, will ensure that groundwater flows to the site are retained, and there will be no adverse effects; and
- there will be no adverse effects on the SAC from the increase in nitrogen deposition associated with the use of the M62 as a construction traffic route or from the onsite construction route to the west of the SSSI for the Proposed Scheme.

7.4.6 Holcroft Moss SSSI is a component part of the Manchester Mosses SAC and is designated for the same reasons as the SAC. Consequently, it is anticipated that the implementation of measures set out in the documents to inform the Appropriate Assessment will reduce the magnitude of potential impacts to a level where there will be no significant effect on the structure and function of the SSSI.

7.4.7 Highfield Moss SSSI is located 1.2km from land required for the construction of the Proposed Scheme. The surface or groundwater catchment area associated with this SSSI will be unaffected. Given the distance of the Proposed Scheme from the SSSI there will be no significant effect on the structure and function of the SSSI.

7.4.8 Risley Moss SSSI (a component part of the Manchester Mosses SAC) is located 520m from land required for construction of the Proposed Scheme. The surface and groundwater catchment area associated with this SSSI will be unaffected. The A574 Birchwood Way, a construction traffic route, is 300m from the SSSI. Given the distance of the construction traffic route from the SSSI, there will be no significant air quality impacts on the SSSI and therefore no significant effect on the structure and function of the SSSI.

7.4.9 Astley and Bedford Mosses SSSI (a component part of the Manchester Mosses SAC) will not be affected by the construction of the Proposed Scheme. The closest point of construction in the Risley to Bamfurlong area will be the A580 East Lancashire Road construction traffic route, 916m north of the SSSI and the surface and groundwater catchment areas associated with this SSSI will be unaffected. There will be no significant effect on the structure and function of the SSSI.

7.4.10 Abram Flashes SSSI will not be directly affected by the construction of the Proposed Scheme. Works associated with Abram cutting and Abram embankment retaining walls will be adjacent to the northernmost part of the SSSI and SBI. The A58 Lily Lane and the A573 Wigan Road, which will be used as construction traffic routes, and Bamfurlong satellite compound, will also be directly adjacent to the SSSI. The duration of use of the compound and construction traffic routes will be eight years and three months. Air quality assessment has

concluded that there will be no significant impact from nitrogen deposition at Abram Flashes SSSI. Potential impacts to water quality or effects from dust will be managed through implementation of measures in the draft CoCP. Similarly, the effects of any potential noise, vibration and visual disturbance of breeding bird species will be reduced through implementation of the measures in the draft CoCP, including visual and acoustic screening. Construction of Abram cutting could reduce groundwater flow into the SSSI as set out in Volume 5: Appendix WR-003-0MA05. However, surface water management for the Proposed Scheme will compensate for this potential reduction. Therefore, there will be no significant adverse effect on the structure and function of this SSSI.

7.4.11 Bryn Marsh and Ince Moss SSSI and Wigan Flashes LNR (which is within the SSSI) are located adjacent to the existing WCML, where works are programmed to take place intermittently for up to eight years. The effects from dust and waterborne pollution, and noise and vibration on habitats and species (including breeding birds) will be reduced through implementation of the measures in the draft CoCP. Measures such as a noise and vibration management plan and monitoring protocol and visual and acoustic screening of the site will be implemented as appropriate in agreement with Natural England and other relevant consultees. Therefore, there will be no significant effect on the structure and function of the SSSI and LNR.

7.4.12 Utilities works to modify an existing overhead power line will be confined to the eastern extent of Silver Lane and will not directly affect Gorse Covert Mounds LWS. Construction access for M62 West viaduct south satellite compound will result in the loss of woodland habitats along the northern edge of Gorse Covert Mounds LWS. This area is 0.7ha (4%) of the LWS. The effects from dust from construction traffic on vegetation will be addressed by the implementation of measures in the draft CoCP, which will reduce the magnitude of this impact to a level where there will be no significant effects. However, habitat loss will result in a permanent adverse effect on the structure and function of the LWS that will be significant at the county/metropolitan level.

7.4.13 Construction of Culcheth South embankment and associated drainage ditches will result in the loss of 10.4ha (54%) of marshy grassland, semi-improved grassland, woodland, plantation woodland and two waterbodies in Silver Lane Ponds LWS and will impact water flow and quality at the site, as set out in Volume 5: Appendix WR-003-0MA05. The permanent loss of habitat will result in a permanent adverse effect on the structure and function of the site, which will be significant at the county/metropolitan level.

7.4.14 The diversion of an overhead power line and Footpath Culcheth and Glazebury 108 public right of way associated with the construction of Culcheth North embankment will result in the loss of 0.14ha (12%) of woodland from Eleven Acre Common LWS. The small loss of habitat will result in a permanent adverse effect on the structure and function of the site that will be significant at the district/borough level.

7.4.15 Construction of Lowton North embankment will result in the loss of 4ha (34%) of species-rich and species-poor unimproved and semi-improved grassland, three waterbodies and scrub habitats from Ponds Near Lightshaw Lane SBI. Land required for construction of the

Proposed Scheme runs through the centre of the SBI, fragmenting these habitats. Habitat loss and severance will result in a permanent adverse effect on the structure and function of the site that will be significant at the county/metropolitan level.

Habitats

Woodland

7.4.16 There are no ancient woodlands in the Risley to Bamfurlong area. However, there are a number of non-ancient woodlands that will be affected by the construction of the Proposed Scheme.

7.4.17 Construction access for M62 West viaduct south satellite compound will result in the loss of 0.5ha (5%) of woodland habitat as well as a small area of other habitat on the northern edge of Gorse Covert Mounds LWS. The loss of habitat will have an adverse effect on the conservation status of the woodland that will be significant at the county/metropolitan level.

7.4.18 Realignment of the M62 comprising widening of the central reservation east of junction 11 will result in the permanent loss of 2ha (42%) of woodland habitat known as Woods Near Holcroft Moss adjacent to and north and south of the M62. The loss of this woodland will result in a permanent adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.19 Construction of Culcheth South embankment will result in the permanent loss of 0.9ha (71%) of woodland habitat and 0.7ha (33%) of plantation woodland habitat partially within Silver Lane Ponds LWS. The loss of this woodland will have a permanent adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.20 Utilities works associated with the construction of the Proposed Scheme will result in the loss of 0.3ha (4%) of woodland habitat within Culcheth Linear Park due to the installation of surface water discharge points. Given the small area of loss for this woodland, this will have an adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.21 Utilities works and the diversion of Footpath Culcheth and Glazebury 108 public right of way associated with the construction of the Proposed Scheme will result in the loss of 0.14ha (12%) of woodland habitat within Eleven Acre Common LWS. The small area of loss for this woodland will have an adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.22 Utilities works associated with the construction of the Proposed Scheme will result in the permanent loss of 0.6ha (35%) of woodland habitat near Birchalls Farm. The loss of this woodland habitat will have a permanent adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.23 Construction of Aye Bridge embankment and retaining walls will result in the loss of 0.1ha (2%) of woodland habitat located adjacent and west of the WCML and east of Stubshaw

Cross. Given the small area of loss for this woodland, this will have an adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.24 Construction of Lowton North embankment and utilities works associated with the construction of the Proposed Scheme will result in the permanent loss of 9ha (87%) of mixed woodland habitat within Byrom Wood. The loss of this woodland habitat will have a permanent adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

7.4.25 Construction of Abram cutting will result in the permanent loss of 1.7ha (18%) of woodland habitat within Viridor Wood, east of the WCML and south-east of Bamfurlong. The loss of this woodland habitat will have a permanent adverse effect on the conservation status of the woodland that will be significant at the district/borough level.

Grassland

7.4.26 Construction of Culcheth South embankment will result in the permanent loss of 3.2ha (50%) of marshy grassland and semi-improved neutral grassland habitat within Silver Lane Ponds LWS. The loss of this grassland habitat will have a permanent adverse effect on the conservation status of the grassland that will be significant at the county/metropolitan level.

7.4.27 The construction of Lowton North embankment and associated utilities work will result in the permanent loss of 3.2ha (31%) of species-rich and species-poor unimproved and semi-improved grassland in Ponds Near Lightshaw Lane SBI. The loss of this grassland habitat will have a permanent adverse effect on the conservation status of the grassland that will be significant at the county/metropolitan level.

7.4.28 Construction of Lowton South embankment will result in the permanent loss of 1ha (100%) of semi-improved neutral grassland adjacent to Slag Lane. The loss of this grassland will have a permanent adverse effect on the conservation status of the grassland that will be significant at the district/borough level.

7.4.29 Construction of Lowton South embankment will result in the permanent loss of 0.3ha (87%) semi-improved neutral grassland north-east of Golborne. The loss of this grassland habitat will have a permanent adverse effect on the conservation status of the grassland that will be significant at the district/borough level.

Hedgerows

7.4.30 On a precautionary basis, it is assumed that all hedgerows (41.9km) within the land required for the construction of the Proposed Scheme in the Risley to Bamfurlong area will be permanently lost and the remaining hedgerow network will be fragmented. This includes the native species-rich hedgerows east of Golborne, Lightshaw Hall and north of Culcheth. This total, however, includes some hedges that are likely to be retained, such as those located within land required for overhead line diversions/realignments and those located within land required for habitat creation. The combined loss and severance of hedgerows within

land required for construction of the Proposed Scheme will have a permanent adverse effect that will be significant at the county/metropolitan level.

Watercourses

7.4.31 The route of the Proposed Scheme will cross Carr Brook, Small Brook, Windy Bank Brook, Nan Holes Brook and Coffin Lane Brook. These watercourses will be permanently realigned or culverted, reducing the connectivity of the habitat corridors associated with them. The habitat loss and reduction in connectivity will result in a permanent adverse effect that will be significant at up to county/metropolitan level. A series of smaller watercourses will also be permanently realigned or culverted, such as Hey Brook, reducing the connectivity of the habitat corridors associated with these watercourses. The habitat loss and reduction in connectivity will result in a permanent adverse effect on the conservation status of the watercourses that will be significant at up to district/borough level.

Water bodies

7.4.32 On a precautionary basis it is assumed that 51 of the 60 ponds located within land required for construction of the Proposed Scheme in the Risley to Bamfurlong area will be permanently lost. This total, however, includes some ponds that are likely to be retained such as those located within the land required for overhead line diversions/realignments. It is assumed that nine ponds within land required for habitat creation will be retained. Where survey has not been possible, a precautionary approach to the assessment has been applied. The loss of ponds within the land required for construction of the Proposed Scheme will lead to a permanent adverse effect on the conservation status of the water bodies that will be significant, in each case, up to district/borough level.

Species

Terrestrial invertebrates

7.4.33 Construction of Lowton cutting will result in the loss of 0.6ha (30%) of the unnamed woodland at the dismantled railway line near Birchalls Farm, which supports an invertebrate assemblage containing several notable species. Habitat loss is likely to have an adverse effect on the conservation status of the invertebrate assemblage which will be significant at the district/borough level.

Bats

7.4.34 The removal or disturbance of habitat features that are utilised by bats during breeding, hibernation or migrating between roosts is considered to have the potential to result in adverse effects on the bat populations or assemblages during construction. However, the point at which such impacts are considered likely to result in significant adverse effects on the conservation status of a population will differ depending on the status of the species concerned.

7.4.35 The impact of disturbance on bat populations will generally be localised and limited to the period of construction. Bats utilising retained habitats may be subject to irregular and localised disturbance from lighting and noise during the construction period where works in autumn, winter and spring may be carried out for short periods after dusk or prior to dawn. These impacts will only temporarily deter bats from using foraging and commuting habitats and the implementation of measures that are described in the draft CoCP will reduce potential disturbance effects to a level that is not significant.

7.4.36 Construction of Culcheth cutting, Culcheth North embankment and Culcheth South embankment will result in impacts on the bat assemblage between the M62 and Culcheth Linear Park. A common pipistrelle occasional roost, a soprano pipistrelle occasional roost, a *Pipistrellus* species occasional roost and a *Myotis* species occasional roost are located between 1m and 25m from land required for the construction of the Proposed Scheme. The proximity of construction activities to these roosts and the resulting level of noise and vibration is likely to result in them becoming unviable for continued use and, on a precautionary basis, it is assumed the roosts will be lost. Construction of Culcheth South embankment will also result in the fragmentation of woodland, grassland and waterbodies, within Silver Lane Ponds LWS which are key commuting and foraging habitats used by all bat species present. The loss of the roosts combined with the loss of habitat at Silver Lane Ponds LWS will result in a permanent adverse effect on the conservation status of the bat assemblage between the M62 and Culcheth Linear Park, which will be significant at the regional level.

7.4.37 Construction of Lowton North embankment and Aye Bridge embankment will result in impacts on the bat assemblage at Abram and Pennington Flashes, including the loss of a common pipistrelle and soprano pipistrelle occasional roost. Construction of the Proposed Scheme will also result in the disturbance of a common pipistrelle possible maternity roost located 30m from the land required for the construction of the Proposed Scheme. Maternity roosts are important to the continued breeding success of bat populations. The proximity of construction activities to the roost and the resulting level of noise and vibration is likely to result in these roosts becoming unviable for continued use and, on a precautionary basis, it is assumed the roosts will be lost. Construction of the Proposed Scheme will result in the loss and fragmentation of Byrom Wood and Viridor Wood, which are both key foraging area, used by common and rarer bat species such as serotine, noctule and *Myotis* species including Leisler's bat. The loss of the possible maternity roost and fragmentation of the key foraging habitat will result in a permanent adverse effect on the conservation status of the bat assemblage at Abram and Pennington Flashes, which will be significant at the regional level.

7.4.38 Construction of Lowton South embankment, Lowton cutting and Lowton North embankment will result in impacts on the bat assemblage at Lowton, including the loss of a soprano pipistrelle occasional roost located within the land required for construction of the Proposed Scheme. It will also result in the disturbance of a pipistrelle species and a common pipistrelle occasional roost, and a brown long eared and common and soprano pipistrelle occasional roost located between 7m and 15m from the land required for construction of the Proposed

Scheme. The proximity of construction activities to these roosts is likely to result in them becoming unviable for continued use and, on a precautionary basis, it is assumed the roosts will be lost. Construction of Lowton North embankment will result in the loss and fragmentation of habitats along Slag Lane, a key commuting corridor which is used by rarer species such as *Myotis* species and noctule bats and could include significant roosts for noctule and Leisler's bat. The loss of the roosts, and the fragmentation of the key commuting route, will result in a permanent adverse effect on the conservation status of the bat assemblage at Lowton, which will be significant at up to regional level.

7.4.39 An assemblage of both common and rarer bat species, including noctule, Leisler's bat and Myotis species utilise the habitats (woodland and grassland) between woodland south of Holcroft Moss to the M62 in the Risley to Bamfurlong area and the Broomedge to Glazebrook area (MA04). Construction of M62 West viaduct within the Risley to Bamfurlong area will result in the removal and fragmentation of foraging and commuting habitat. The loss of connectivity in this area will result in a permanent adverse effect on the bat assemblage. The combined effect in the Risley to Bamfurlong and the Broomedge to Glazebrook area (MA04) from the impacts on foraging and commuting habitat of rarer species including noctule, Leisler's bat and *Myotis* species, represents a permanent adverse effect on the conservation status of the bat assemblage that is significant at the county/metropolitan level.

7.4.40 Loss of other suitable habitats within land required for construction of the Proposed Scheme may require some bats to travel further and expend more energy during day-to-day foraging and movement throughout their home range for the duration of construction. However, such effects alone are for all species considered unlikely to result in sufficient disturbance of the populations or assemblages concerned to result in an adverse effect on their conservation status.

Birds

7.4.41 Construction of Culcheth South embankment, Culcheth cutting, Culcheth North embankment and Lowton North embankment will result in the permanent loss of barn owl foraging habitat, which includes semi-improved and improved pasture and the margins of arable fields. Given the large area of habitat that will be lost and the territorial nature of barn owl there will be a permanent adverse effect on the conservation status of barn owls, which will be significant at the county/metropolitan level.

7.4.42 Construction of Abram cutting will result in the permanent loss of possible willow tit breeding habitat, which includes scrub and broad-leaved woodland. Given the limited areas of alternative suitable breeding habitat for willow tit, on a precautionary basis, this will result in a permanent adverse effect on the conservation status of willow tit, which will be significant at the county/metropolitan level.

Amphibians

7.4.43 There is one population and four meta-populations of great crested newt within the Risley to Bamfurlong area where habitat loss resulting from the construction of the Proposed Scheme will result in significant adverse effects at up to the county/metropolitan level. These are as follows:

- GCNMP1.5.2, south of Culcheth;
- GCNMP1.5.4, west of Culcheth;
- GCNP1.5.11, south-east of Golborne;
- GCNMP1.5.14, south-east of Golborne; and
- GCNMP1.5.15, north-east of Golborne.

7.4.44 Of the 60 ponds within land required for construction of the Proposed Scheme that require survey within the Risley to Bamfurlong area, four have been confirmed as supporting great crested newt, 13 have been assessed as being unsuitable for this species, and 16 have been found not to support the species. The remaining 27 have not been surveyed due to access constraints and are assumed to support populations of great crested newt and the loss of the ponds supporting these populations could result in a permanent adverse effect on amphibian populations that will be, in each case, significant at up to the county/metropolitan level.

Other mitigation measures

7.4.45 This section describes other mitigation measures designed to reduce or compensate for significant ecological effects. These include habitat creation and habitat enhancement.

Habitats

Woodland

7.4.46 The Proposed Scheme will result in the loss of 0.5ha of deciduous woodland at Gorse Covert Mounds LWS which will be significant at the county/metropolitan level. The combined loss of 5.5ha of lowland deciduous woodland at Woods Near Holcroft Moss, Silver Lane Ponds LWS, Culcheth Linear Park, Eleven Area Common LWS, Birchalls Farm, west of Stubshaw Cross and Viridor Wood will each be significant at the district/borough level. The combined loss of 6.9ha of plantation woodland at Byrom Wood and Silver Lane Ponds LWS will each be significant at the district/borough level.

7.4.47 There will be a further loss and fragmentation from 23 woodlands in the Risley to Bamfurlong area, of 3.9ha of lowland deciduous woodland and 1.9ha of plantation and mixed plantation woodland as reported within the register of local/parish effects (Volume 5: Appendix EC-015-0MA05). The loss and fragmentation of habitat from each of these woodlands will be significant at the local/parish level.

7.4.48 In accordance with the Ecological Principles of Mitigation in the SMR, a route-wide, integrated strategic approach has been developed to compensate for the loss of woodland. The woodland habitat creation in this area is to compensate for the loss of woodland habitat in the local area as well as to ensure that the populations of protected and notable species including bats are maintained. With these objectives in mind, where reasonably practicable, the locations of woodland habitat creation have been selected so as to increase the size of existing higher quality habitat and to increase connectivity.

7.4.49 The loss of woodland will be partly compensated through a range of measures, including planting of native broadleaved woodland as follows:

- 1.5ha to connect to woodland adjacent to the M62, and 1.5ha on the south-east side of Silver Lane Ponds LWS which will compensate for the loss of 2.7ha of the woodland known as Woods Near Holcroft Moss;
- 1.3ha to the west side and 1ha to the north-west of Silver Lane Ponds LWS, which will compensate for the loss of 0.9ha of semi-natural broadleaved woodland and 0.7ha of plantation woodland from the LWS and enhance ecological connectivity to surrounding habitat;
- 0.7ha of woodland adjacent and to the east of Gorse Covert Mounds LWS and 0.7ha replacement planting to compensate for the loss of 0.7ha of woodland at this site;
- 9.2ha on both sides of the dismantled railway and adjacent to Eleven Acre Common LWS, which will enhance ecological connectivity of the woodland at Culcheth Linear Park, compensate for the loss of 0.3ha of woodland at Culcheth Linear Park and the loss of 0.14ha at Eleven Acre Common LWS, which is a target site of the Great Manchester Wetlands local NIA;
- 3.5ha of woodland at Byrom Wood to compensate for the loss of 1.7ha of semi-natural broadleaved woodland at Viridor Wood, and to provide connectivity to existing retained woodland; and
- 1.1ha on the south side of Nan Holes Brook, which will compensate for the loss of 0.1ha of woodland east of the WCML and west of Stubshaw Cross.

7.4.50 The target habitat type for woodland planting is lowland mixed deciduous woodland habitat of principal importance. The new areas of woodland habitat will 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 the effect will be reduced to a level that is not significant.

7.4.51 Landscape mitigation planting will provide some additional benefits to wildlife and will help to connect areas of higher quality habitats.

Grassland

7.4.52 In accordance with the Ecological Principles of Mitigation in the SMR a route-wide, integrated strategic approach has been developed to compensate for loss of lowland meadow habitat. The species rich grassland creation in this area is required to compensate for the loss of

grassland habitat in the local area as well as to ensure that the populations of protected and notable species including great crested newts, bats and barn owls are maintained. With these objectives in mind, where reasonably practicable, the locations of grassland creation have been located so as to increase the size of existing higher quality habitat and to increase connectivity.

7.4.53 In response to the 3ha loss of marshy grassland from Silver Lane Ponds LWS, 2ha of marshy grassland on areas affected during construction will be restored. A 4.8ha area of marshy grassland and 2.5ha of wetland habitat will also be created, adjacent to and respectively to the east and north of the LWS. The loss of habitat at Gorse Covert Mounds will be compensated by 4.8ha of wetland habitat that will be created adjacent to Holcroft Moss SSSI, providing additional connectivity between the SSSI and Gorse Covert Mounds LWS. An area of species rich grassland 1.6ha in size will be created north of the LWS, on land likely to have similar soils to the LWS and therefore suitable for replicating the damp species-rich grassland for which the site is designated. Following establishment and restoration, the adverse effect on marshy grassland will be reduced to a level that is not significant.

7.4.54 In response to the 3.2ha loss and fragmentation of species-rich and species-poor grassland from Ponds Near Lightshaw Lane SBI, an area of 18ha of dry and marshy grassland will be created adjacent to the SBI and 3.8ha of semi-improved and species-poor semi-improved grassland within the SBI will be enhanced. This will also provide terrestrial habitat for great crested newt (and contain breeding ponds to replace those removed by the Proposed Scheme), and foraging habitat for barn owl. Following establishment and restoration, the adverse effect on species-rich and species-poor grassland will be reduced to a level that is not significant.

7.4.55 Measures to compensate for the loss of semi-improved neutral grassland elsewhere in the Risley to Bamfurlong area include the creation of 1.4ha and 0.7ha of species-rich grassland south and north respectively of the Taylor Business Park, 4.9ha adjacent to Culcheth Linear Park and 1.6ha south of Lowton. Following establishment and restoration the adverse effect on semi-improved grassland will be reduced to a level that is not significant.

Hedgerows

7.4.56 New hedgerows will be planted as replacement for those lost as a result of the Proposed Scheme. A total of 17.1km of new hedgerows will be planted and the species composition will be characteristic of the surrounding area. This represents a net decrease in hedgerow of 24.8km after mitigation, which is a residual adverse effect that will be significant at the county/metropolitan level.

Watercourses

7.4.57 Where smaller watercourses are realigned, the channel will be naturalised, where reasonably practicable, with a profile to promote the establishment of marginal vegetation and pools.

Water bodies

7.4.58 At least one pond will be created for every pond lost within the land required for the construction of the Proposed Scheme. New ponds will be established in accordance with the Ecological Principles of Mitigation in the SMR. Once established, it is anticipated that any adverse effect on pond habitats will be reduced to a level that is not significant.

Species

Terrestrial invertebrates

7.4.59 Habitat restoration and creation measures at and adjacent to Silver Lane Ponds LWS will include grassland and wetland habitats suitable for the invertebrate assemblage at this site. Following the implementation of these measures, the adverse effects on the invertebrate assemblage will be reduced to a level that is not significant.

7.4.60 Habitat creation adjacent to Culcheth Linear Park will include habitats suitable for the invertebrate assemblage at the unnamed woodland at the dismantled railway near Birchalls Farm. Following the implementation of these measures, the adverse effects on the conservation status of this assemblage will be reduced to a level that is not significant.

Bats

7.4.61 To replace roosts that will be lost to construction, artificial roosts will be provided across the Proposed Scheme in accordance with the Ecological Principles of Mitigation within the SMR. The habitat creation measures detailed above in response to habitat loss, including creation of grasslands, hedgerows, new ponds and semi-natural woodlands will compensate for those bat foraging habitats lost within land required for construction of the Proposed Scheme as detailed below.

7.4.62 The disturbance of two common pipistrelle occasional roosts, a *Pipistrellus* species occasional roost and a *Myotis* species roost, which are component species of the bat assemblage between the M62 and Culcheth Linear Park, will be addressed by providing alternative roosting facilities in retained areas as close to the roosts being disturbed as possible. The loss of foraging and commuting habitat used by the bat assemblage will be addressed by woodland planting, hedgerow planting and the creation of wetland and grassland habitat at Silver Lane Ponds LWS and Culcheth Linear Park. Following the implementation of these measures, the effects on the bat assemblage between the M62 and Culcheth Linear Park will be reduced to a level that is not significant.

7.4.63 The loss of common pipistrelle and soprano pipistrelle occasional roosts and the loss of a common pipistrelle possible maternity roost, species which are a component of the bat assemblage at Abram and Pennington Flashes, will be addressed by providing alternative roosting facilities in retained areas as close to the roosts being lost and disturbed, as possible. The loss of foraging and commuting habitat used by the bat assemblage will be addressed by woodland planting, hedgerow planting and the creation of wetland and

grassland habitat at Byrom Wood and adjacent to Ponds Near Lightshaw Lane LWS. Loss of habitat at Viridor Wood will be addressed by hedgerow creation, and woodland planting and wetland habitat creation at Nan Holes Brook. Following the implementation of these measures, the effect on the bat population at Abram and Pennington the Flashes will be reduced to a level that is not significant.

7.4.64 The loss of possible Leisler's bat and noctule roosts near to Slag Lane, the loss or disturbance of occasional roosts of soprano pipistrelle, common pipistrelle, pipistrelle species and brown long-eared bats will be addressed by providing alternative roosting opportunities in retained areas as close to the roosts being lost or disturbed as possible. Hedgerow creation along the realigned Slag Lane and beneath Slag Lane viaduct will provide connectivity below the route of the Proposed Scheme, allowing the key commuting route for bats to be maintained. Following the implementation of these measures, the effects on the bat assemblage at Lowton will be reduced to a level that is not significant.

7.4.65 The loss of foraging and commuting habitat used by the bat assemblage between woodland south of Holcroft Moss to the M62 in the Risley to Bamfurlong area and the Broomedge to Glazebrook area (MA04) will be addressed by the creation of hedgerow, woodland, grassland, wetland habitat and ponds. This will include woodland and hedgerow planting at Glazebrook and Woods near Holcroft Moss, and grassland and wetland habitat created adjacent to Holcroft Moss and at Glazebrook within the Risley to Bamfurlong area. Following the implementation of these measures, the effects on the bat assemblage in this area will be reduced to a level that is not significant.

Birds

7.4.66 Habitat creation to address the loss of foraging habitat for the potential barn owl population in the Risley to Bamfurlong area will include the provision of grassland habitat creation in two areas adjacent to Silver Lane Ponds LWS, in an area adjacent to Taylor Business Park and near Lightshaw Hall. Once the habitats have become established, the adverse effect on barn owl populations resulting from the loss of foraging habitat in the Risley to Bamfurlong area will be reduced to a level that is not significant.

7.4.67 Measures to address the adverse effects on the potential breeding willow tit population in the Risley to Bamfurlong area will include the provision wetland habitat creation adjacent to Nan Holes Brook, near Lightshaw Hall and at Ponds Near Lightshaw Lane SBI Once the habitats have become established, the adverse effect on the willow tit population resulting from the loss of potential nesting sites in the Risley to Bamfurlong area will be reduced to a level that is not significant.

Amphibians

7.4.68 Ponds, species-rich grassland and broadleaved woodland included as part of the Proposed Scheme will be designed to compensate for the loss of breeding sites, foraging habitat and places of shelter used by great crested newts and other amphibians. Compensation will be provided within ecological habitat creation areas adjacent to Silver Lane Ponds LWS,

adjacent to Culcheth Linear Park, north of Lowton and adjacent to Ponds Near Lightshaw Lane SBI. Ponds, grassland and woodland will be established in accordance with the Ecological Principles of Mitigation within the SMR. Following implementation, the adverse effects on amphibian populations in the Risley to Bamfurlong area will be reduced to a level that is not significant. HS2 Ltd will continue to survey ponds for great crested newt populations, and where it is confirmed that populations are absent then pond and terrestrial habitat provision will be re-assessed.

Badger

7.4.69 Although there will be no significant effects on badger populations in this area, mitigation measures to address the potential disturbance of badgers will be provided in accordance with the Ecological Principles of Mitigation within the SMR and the implementation of measures in the draft CoCP. This will include the provision of badger proof fencing and replacement setts where necessary.

Summary of likely residual significant effects

7.4.70 This section describes likely significant residual ecological effects during construction, taking account of the mitigation and compensation proposed.

7.4.71 On a precautionary basis, it is assumed that there will be a net loss in hedgerow of 24.8km, which will result in a permanent adverse residual effect that is significant at the county/metropolitan level. In addition to the mitigation described, opportunities will be sought for additional retention and replacement of hedgerow within the land required for temporary works.

7.5 Effects arising from operation

Avoidance and mitigation measures

7.5.1 Within this section of the Proposed Scheme the following elements of the design will avoid or reduce impacts on features of ecological value during operation:

- M62 West viaduct and A573 Wigan Road viaduct will provide ecological connectivity under the route of the Proposed Scheme to adjacent habitats. This will reduce habitat fragmentation and barrier effects, allowing free passage of wildlife at these locations;
- seven underbridges will maintain farm access and/or public access on footpaths or bridleways across the route of the Proposed Scheme. These structures will be of a sufficient size to also allow for the passage of a range of wildlife species and their primary purpose will not discourage use by most wildlife species. These underbridges will reduce barrier effects by facilitating wildlife movement across the Proposed Scheme; and

- where the route of the Proposed Scheme crosses a watercourse, an appropriately designed culvert or dry tunnel will be provided to allow passage for a range of wildlife species including mammals such as otter and water vole.

Assessment of impacts and effects

7.5.2 Significant effects arising during operation at the district/ borough level or above are described below. Significant effects on ecological features at the local/parish level are listed in Volume 5: Appendix EC-015-0MA05.

Species

Bats

7.5.3 The operation of the Proposed Scheme has the potential to result in a variety of impacts on bat populations including those as a result of collision with passing trains, turbulence and noise. The point at which such impacts are considered to result in a significant adverse effect on the conservation status of the population concerned will differ between species. As a consequence, the following assessment of operational impacts takes into account the differing character and nature of the bat populations and/or assemblages concerned in determining the likely effects of the Proposed Scheme on each of these receptors.

7.5.4 Due to the large areas over which bats forage it is likely that any loss of, or displacement from, suitable foraging habitat in the vicinity of the Proposed Scheme will in itself amount to only a small proportion of the wider available resource. However, the impact of any such disturbance or displacement could be greatly increased if bats are hampered in moving between breeding sites, hibernation sites and other roosts which they commonly utilise.

7.5.5 Noise, vibration and lighting associated with passing trains have the potential to disturb bat species foraging and commuting within habitats close to the Proposed Scheme. Understanding of the impact of noise on bats caused by passing trains is limited. Research suggests that gleaning bats, such as brown long-eared, will have reduced foraging success within areas where there is persistent noise from busy roads[55]. However, noise generated from passing trains will be regular but temporary and as such will differ from that resulting from a busy road.

7.5.6 Where the route of the Proposed Scheme bisects, or is located in proximity to existing features known to be utilised regularly by foraging or commuting bats, there is an increased risk that bats could be killed or injured as a result of collisions with passing trains or associated turbulence. The significance of any such effect will be dependent on both the flight height range of the species and the vertical alignment of the Proposed Scheme (i.e.

[55] Schaub, A., Ostwald, J. & Siemers, B.M. (2008), *Foraging bats avoid noise*, Journal of Experimental Biology 211, 3174-3180.

whether the route of the Proposed Scheme is in cutting, at grade or on embankment) at the point the impact occurs.

7.5.7 The creation of woodland along the southern side of the realigned section of the M62 will connect to existing woodland and the foraging habitats at Holcroft Moss and Gorse Covert Mounds used by bats within the assemblage at Holcroft Moss to the M62. Bats flying towards the Proposed Scheme will be encouraged by this planting to cross beneath the route of the Proposed Scheme at M62 West viaduct.

7.5.8 Hedgerow creation along the realigned Slag Lane and beneath Slag Lane viaduct will encourage bats, which are part of the bat assemblage at Lowton, to cross beneath the route of the Proposed Scheme, allowing the key commuting route for bats to be maintained.

7.5.9 Although it is possible that there may be infrequent incidental mortality of individual bats, due to the avoidance measures described above and the availability of alternative foraging and commuting habitat on either side of the Proposed Scheme, this is unlikely to result in a significant adverse effect on the conservation status of the bat assemblages present in the Risley to Bamfurlong area.

Birds

7.5.10 The majority of bird species that are known to be present in the area are not considered to be particularly vulnerable to collision with trains. However, barn owls hunt low over the rough grassland habitats that are associated with embankments and are slow moving and are, therefore, likely to be subject to collision with high speed trains. Research undertaken by the British Trust for Ornithology on behalf of HS2 Ltd suggests that there may be effects on barn owls up to 3km away[56]. This means that more barn owls are likely to be affected than those in the vicinity of the Proposed Scheme identified above, such as at Silver Lane Ponds LWS. This will result in a permanent residual adverse effect on barn owls that will be significant at the county/metropolitan level.

Other mitigation measures

7.5.11 A Barn Owl Mitigation Plan will be prepared to identify the measures that can be implemented to help offset the effects on barn owls. As the availability of nesting sites is a limiting factor for this species the provision of additional nest boxes would be likely to increase numbers of barn owls within the wider landscape and thus offset the adverse effect.

Summary of likely residual significant effects

7.5.12 The mitigation, compensation and enhancement measures described above are likely to reduce the residual ecological effects during operation to a level that is not significant,

[56] Pringle, H., Siriwardena, G. & Toms, M. (2016), *Informing best practice for mitigation and enhancement measures for Barn Owls*. British Trust for Ornithology, Thetford.

except for barn owl. Train strike is likely to result in the loss of barn owls that nest within 3km of the route of the Proposed Scheme resulting in a residual significant effect at the county/metropolitan level. However, if the proposed mitigation measures for barn owl are implemented through liaison with landowners and other relevant stakeholders, the residual effect on barn owl would be reduced to a level that is not significant.

Cumulative effects

7.5.13 No cumulative effects on ecology receptors have been identified from other committed developments in the Risley to Bamfurlong area.

Monitoring

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

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

8 Health

8.1 Introduction

8.1.1 This section identifies the communities within the Risley to Bamfurlong area that will be subject to impacts associated with the Proposed Scheme and describes how these impacts are likely to affect 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, including Public Health England and local Directors of Public Health, has been undertaken to inform the health assessment process. Consultation with communities, local authorities and parish councils has been ongoing throughout the route design and assessment process, as described in Volume 1, Section 3. This has contributed to the measures identified to avoid and mitigate adverse health effects.

8.1.3 The assessment also draws on health-related information and views expressed in consultation responses from the owners and/or operators of the following affected resources within the Risley to Bamfurlong study area:

- Hesketh Meadows Playing Fields, Lowton;
- Byrom Wood, Lowton, which contains publicly accessible walking routes; and
- Lowton Junior and Infant School.

8.1.4 This section deals specifically with impacts at a local level within the Risley to Bamfurlong area. Health effects assessed across the Proposed Scheme as a whole are reported in Volume 3, Route-wide effects, Section 8.

8.1.5 Further details of the health assessment, including the criteria used to assess effects on population health as described in the EIA Scope and Methodology Report (SMR)[57], are contained in Volume 5: Appendix HA-001-0MA05 Health assessment matrix.

8.1.6 Maps showing the location of the key environmental features (Map Series CT-10), construction features (Map Series CT-05), and key operational features (Map Series CT-06) of the Proposed Scheme can be found in the Volume 2, MA05 Map Book. The Proposed Scheme is described in Section 2.

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 SMR.

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

[57] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

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 impacts of the Proposed Scheme on a range of environmental and socio-economic 'health determinants' could result in adverse or beneficial effects on health and wellbeing. This process of assessing these effects is documented in the health assessment matrices in Volume 5: Appendix HA-001-0MA05. Based on this a professional judgement has been made to identify those effects on population health and wellbeing that are sufficiently important to report within the health assessment sections found in this report and Volume 3, Route-wide effects.

8.2.4 The health determinants of relevance within the Risley to Bamfurlong area during construction (temporary and permanent impacts) are:

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

8.2.5 One health determinant, neighbourhood quality, has been identified as being relevant within the Risley to Bamfurlong area during operation (permanent).

8.2.6 Additionally, health effects that are relevant along the route of the Proposed Scheme as a whole are reported in Volume 3, Route-wide effects, Section 8.

8.2.7 The geographic extent of the health assessment covers those areas where impacts on health determinants are predicted to occur. Health effects arising from impacts on a particular resource may affect communities across a wide area. These effects are described in the report section corresponding to the location of the resource itself. Health effects arising from reduced access to resources, for example as a result of traffic delays, are described in the report section corresponding to the community whose access is restricted.

8.2.8 The health assessment methodology is based on a review of published evidence showing how impacts on health determinants are linked to health effects in a large population. The health assessment is based on a review of evidence linking changes in health determinants to potential health outcomes. This information is presented in Volume 5: Appendix HA-002-00000. The strength of evidence varies; 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.

8.2.9 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'.

8.3 Environmental baseline

Existing baseline

Description of communities in the Risley to Bamfurlong area

8.3.1 The route of the Proposed Scheme will extend from Birchwood, Risley and Croft in the south, passing close to the settlements of Culcheth and Wigshaw. The route of the Proposed Scheme will pass through Lowton and Golborne before passing close to Abram and Bamfurlong in the north. A more detailed description of community facilities is provided in Section 6, Community.

Risley, Culcheth and Surrounds

8.3.2 This area covers the settlements of Risley, Birchwood, Culcheth and surrounds, from the southern boundary of the Risley to Bamfurlong area to the A580 East Lancashire Road.

8.3.3 Risley comprises approximately 40 residential properties. The nearest residential properties are located 1.4km south of the route of the Proposed Scheme.

8.3.4 Birchwood is a suburb of Warrington comprising approximately 1,200 residential properties. The nearest residential properties are located 850m south of the route of the Proposed Scheme.

8.3.5 Croft comprises approximately 550 residential properties. The nearest residential properties are located 700m south of the route of the Proposed Scheme. Community resources within Croft include Croft Primary School, Croft Riding Centre, and Christ Church.

8.3.6 Little Town comprises approximately 50 residential properties. The nearest residential properties are located 500m south-west of the route of the Proposed Scheme.

8.3.7 Culcheth is a settlement comprising approximately 3,000 residential properties. The nearest residential properties are located 350m to the north of the route of the Proposed Scheme. Community resources within Culcheth include schools, places of worship, medical facilities, and recreational facilities including Shaw Street recreational ground, Culcheth Sports Club and Culcheth Linear Park.

8.3.8 On the south-eastern outskirts of Culcheth is the Oaks recreational ground, which comprises six football pitches and is the site for the Culcheth Athletic Junior Football Club. This is adjacent to the site of Yew Tree Farm Caravan Site, which is used for both short and long stays. On the north-east outskirts of the village is Leigh Golf Club and golf course and Laylands Farm Campsite.

8.3.9 Wigshaw comprises approximately 20 residential properties. The nearest residential properties are located 70m north-west of the route of the Proposed Scheme. Warehouse Studios is a group of businesses located on Glaziers Lane. English Karate Academy, a karate school offering lessons for people of all ages, is located within Warehouse Studios. Partridge Lakes Fishery, a 28ha recreational fishing facility, is located immediately to the south of the route of the Proposed Scheme.

Lowton, Golborne and surrounds

8.3.10 This area covers the settlements of Lowton, Golborne and surrounds, from the A580 East Lancashire Road to the A573 Wigan Road.

8.3.11 The route of the Proposed Scheme will pass through Lowton, which comprises various suburbs including Lowton Common, Lowton St Mary's and Wash End. Lowton (including its suburbs) has approximately 5,100 residential properties and a range of community facilities. There are residential properties located on the route of the Proposed Scheme. Elmridge Court and Lowton Youth and Community Centre are located to the west of the route of the Proposed Scheme. Elmridge Court is an assisted living and close care complex. Lowton Youth and Community Centre provides a café, sport and recreation and health services to the local community. There are a number of educational facilities in Lowton, including Lowton Junior and Infant School, Lowton St Mary's Church of England Primary School and Nursery, and Lowton Church of England High School.

8.3.12 Hesketh Meadows Playing Fields, which is on Hesketh Meadow Lane in Lowton Common, is a recreational open space with seven football pitches, home to East Leigh Junior Football Club and is on the route of the Proposed Scheme. Gymetc. is located to the west of the route of the Proposed Scheme on the A572 Newton Road and is a private membership gym with swimming facilities and a range of fitness classes.

8.3.13 Golborne is a settlement comprising approximately 6,100 residential properties located to the west of the route of the Proposed Scheme. The nearest residential properties are located 700m south-west of the route of the Proposed Scheme. There are a range of community facilities in Golborne.

8.3.14 Greenheart Regional Park offers promoted routes for walkers, cyclists and horse riders, which links a series of Greenheart sites, including Pennington Flash Country Park and Byrom Wood. Pennington Flash Country Park is located to the east of the route of the Proposed Scheme, between Lowton and Pennington. Byrom Wood is 27ha of publicly accessible woodland and walking routes, which is on the route of the Proposed Scheme, and to the east of Pennington Flash. Other community facilities within Greenheart Regional Park

include Pennington Golf Course, Leigh and Lowton Sailing Club, horse riding and fishing facilities, walking routes, and play and picnic areas.

Abram, Bamfurlong and surrounds

8.3.15 This area covers the settlements of Abram, Bamfurlong and surrounds, from the A573 Wigan Road to the Leeds and Liverpool Canal and the B5327 Bickershaw Lane in the north.

8.3.16 Abram comprises approximately 2,100 residential properties. The nearest residential properties are located 600m to the east of the route of the Proposed Scheme.

8.3.17 Bamfurlong comprises approximately 400 residential properties. The nearest residential properties are located 150m to the north-west of the route of the Proposed Scheme.

8.3.18 Viridor Wood is 100ha of open space and woodland south of Bamfurlong, located immediately west of the route of the Proposed Scheme. Viridor Wood includes several leisure walking routes. Recreational routes in the area include National Route 55 of the National Cycle Network, a predominantly traffic-free route that links Ironbridge to Preston.

Demographic and health profile of the Risley to Bamfurlong area

8.3.19 A review of publicly available health and demographic information has been undertaken to inform the health assessment. The information gathered describes the populations that could be affected by the Proposed Scheme in terms of their key characteristics such as size, distribution, age structure, socio-economic status and health. It enables consideration of the nature of the populations affected and their sensitivity to potential health effects, as well as indicating the prevalence of specific vulnerable groups.

8.3.20 The communities affected by the Proposed Scheme in the Risley to Bamfurlong area have a relatively low population density compared to the national average.

8.3.21 Public health indicators have been benchmarked by Public Health England[58] to show how a local authority compares to England for each specific indicator. The benchmark is presented on a three-point scale: worse than, similar to and better than the English average. The data provided by Public Health England show that this population has a slightly worse health status compared with the English average.

8.3.22 The English Indices of Deprivation[59] rank neighbourhoods from most to least deprived, according to a range of criteria and an overall (combined) ranking. There is a high degree of variation in levels of deprivation in the Risley to Bamfurlong area, with neighbourhoods falling within all bands, from 10% most to 10% least deprived.

[58] Public Health England (2019), *Local Authority Health Profiles*. Available online at: https://fingertips.phe.org.uk/profile/health-profiles.

[59] Department for Housing, Communities and Local Government (2019), *English Indices of Deprivation 2019.* Available online at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019.

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

8.3.24 The available data provide detail down to local authority and ward level and enable a profile to be made of the population within the Risley to Bamfurlong area. The description of the whole population, and the populations within wards, does not preclude the possibility that there will be individuals or groups of people who do not conform to the overall profile.

Future baseline

Construction (2025)

8.3.25 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. The following committed developments of relevance to the health assessment that would materially alter the future baseline during construction of the Proposed Scheme in this area, are set out in Table 16.

Table 16: Committed developments of relevance to health during construction

Map book reference[60]	Planning reference	Description	How this is considered in the assessment
MA05/092	SP4.5	Location: Pocket Nook Lane, Lowton. Partially within land required for construction of the Proposed Scheme - allocation implementable on a reduced area - approx 5% of allocated site would be permanently occupied by the Proposed Scheme. Layout can be configured to take account of the Proposed Scheme.	Informing future baseline.
MA05/089	A/17/84401/OUTMAJ	Location: Pocket Nook Lane, Lowton Outline Planning Application for demolition of existing buildings and construction of 100% Market Housing in accordance with the previous Planning Permission (A/10/74938), accessed from Pocket Nook Lane together with all Associated Works.	Informing future baseline.
MA05/088	A/18/86062/RMMAJ	Location: Pocket Nook Lane, Lowton Application for the erection of 49 dwellings consisting of 12 one -bedroom flats, 12 two-bedroom houses, and 25 three -bedroom houses, following demolition of bungalow.	Informing future baseline.

[60] Volume 5, Planning Data/Committed Development Map Book: Maps CT-13-314b to CT-13-318.

Map book reference[60]	Planning reference	Description	How this is considered in the assessment
MA05/287	A/18/86359/MAJOR	Location: site of Former St Catherine of Sienna Roman Catholic Church Newton Road Lowton Warrington WA3 1LB. Residential development of 26 dwellings with associated garages, landscaping, parking and access.	Informing future baseline.
MA05/039	2016/27387	Location: Culcheth Arms, Church Lane, Warrington. Construction of 10 dwellings with associated access and parking.	Informing future baseline.
MA05/109	A/18/85351/MAJOR	Location: Ullswater Road, Golborne. New build development of new autism centre with 13 apartments and 19 bungalows.	Informing future baseline.
MA05/363	A/18/85361/MAJOR	Location: Lee Lane, Abram. To erect 18 two-storey dwellings with access off Lee Lane.	Informing future baseline.
MA05/353	A/18/86157/MAJOR	Location: 196 Newton Road, Lowton, Warrington. Residential development of 28 dwelling houses comprising of six two-storey detached dwellings, 16 two-storey semi-detached dwellings and six two and a half-storey dwellings with parking and landscaping following demolition of existing building.	Informing future baseline.

8.3.26 It is assumed that the following committed developments will be implemented and have been included as part of the future baseline and considered within this assessment:

- MA05/092 will result in a residential development located partially within the land required for the construction of the Proposed Scheme;
- MA05/089 will result in a residential development located partially within the land required for the construction of the Proposed Scheme;
- MA05/088 will result in a residential development located partially within the land required for the construction of the Proposed Scheme;
- MA05/287 will result in a residential development located 355m to the west of the land required for the construction of the Proposed Scheme;
- MA05/039 will result in a residential development located 413m north-east of the land required for the construction of the Proposed Scheme;
- MA05/109 will result in a residential autism centre located 595m south-west of the land required for the construction of the Proposed Scheme;
- MA05/363 will result in a residential development located 360m to the east of the land required for the construction of the Proposed Scheme; and
- MA05/353 will result in a residential development located immediately to the west of the land required for the construction of the Proposed Scheme.

Operation (2038)

8.3.27 Volume 5: Appendix CT-004-00000 also provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No additional committed developments of relevance for the health assessment have been identified that would materially alter the future baseline in this area.

8.4 Effects arising during construction

Avoidance and mitigation measures

8.4.1 Consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. Insofar as reasonably practicable, mitigation measures have been incorporated into the design of the Proposed Scheme with the aim of avoiding or reducing adverse effects on people. The locations of construction compounds and site haul routes have been selected to reduce the number of people exposed to construction impacts insofar as reasonably practicable. The mitigation measures incorporated into the design of the Proposed Scheme in the Risley to Bamfurlong area are described in Section 2 and include:

- revised design for the realignment of the A574 Warrington Road, which will be 150m east of the existing alignment to reduce impacts to Culcheth Oaks recreational ground, site of Culcheth Athletic Football Club and Yew Tree Farm Caravan Site; and
- Footpath Golborne 33/10 and Footpath Golborne 31/10 will be realigned permanently to maintain access to either side of Byrom Wood. The underbridges in this location will provide pedestrian access between the two halves of the woodland (i.e. maintaining the existing circular walk).

8.4.2 Contractors will be required to comply with the environmental management regime for the Proposed Scheme, set out in the draft Code of Construction Practice (CoCP)[61], which provides a general basis for route-wide construction environmental management. Contractors will also be required to comply with the measures set out in Local Environmental Management Plans (LEMP), which will apply the environmental management strategies at a local level.

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

8.4.4 The draft CoCP will require contractors to produce and implement a community engagement framework, 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. Contractors will be required to take reasonable steps

[61] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice.

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).

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

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

Assessment of impacts and effects

8.4.6 Impacts on health determinants resulting from the construction of the Proposed Scheme are presented in the health assessment matrix in Volume 5: Appendix HA-001-0MA05.The health assessment criteria are described within the SMR. Within the assessment matrix, the assessment criteria are applied to determine which impacts are likely to lead to health and wellbeing effects at the population level. These effects are reported in the assessment sections below.

Neighbourhood quality

8.4.7 The neighbourhood quality assessment identifies changes in the character and amenity of neighbourhoods along the route of the Proposed Scheme. It includes public realm such as streets, footpaths, public squares, parks and playing fields. It does not include residential or other private property. The assessment identifies combinations of impacts on two or more of the following environmental factors within the public realm: traffic, noise and vibration, landscape and visual impacts. When these factors are altered people's levels of satisfaction with their living environment may change, which in turn may affect their mental wellbeing. This may include reduced feelings of attachment to, and pride in, their neighbourhood and reduced enjoyment of outside space.

8.4.8 A review of published research evidence linking neighbourhood quality with health and wellbeing can be found in Volume 5: Appendix HA-002-00000. The evidence linking the various aspects of neighbourhood quality with health outcomes ranges from moderate to strong.

8.4.9 The neighbourhood quality assessment uses information from other topics but does not apply the same assessment thresholds, as it is focused on neighbourhoods rather than individual receptors. The construction of the Proposed Scheme will affect neighbourhood quality through impacts such as noise, visual impacts and additional traffic, including heavy

goods vehicles (HGVs)[62]. These impacts are described in Section 11, Landscape and visual, Section 13, Sound, noise and vibration and Section 14, Traffic and transport.

8.4.10 The construction of the A574 Warrington Road realignment and overbridge will be visible in the vicinity of the existing A574 Warrington Road in Risley. Construction noise will be noticeable in outdoor areas and is expected to last for approximately four months. The A574 Warrington Road is a designated route for construction traffic to enable access to A574 Warrington Road satellite compound. There will be a significant increase in HGV traffic movements between Cross Lane and New Hall Lane during the construction period. People in this community are likely to experience these features of the Proposed Scheme as changing the quality of their neighbourhood and to regard that change as adverse, in diminishing the amenity of the settlement.

8.4.11 The construction of Culcheth cutting will be visible from street level in Wigshaw (Wigshaw Lane and Robins Lane). Construction noise will be noticeable in outdoor areas for approximately 11 months. People in this community are likely to experience these features of the Proposed Scheme as changing the quality of their neighbourhood and to regard that change as adverse, in diminishing the amenity of the settlement.

8.4.12 The construction of Lowton cutting will be visible from street level in Lowton (Lowton Common, Lowton St. Mary's and Wash End). Construction noise will be noticeable in outdoor areas, for approximately one year and eight months. People in these communities are likely to experience these features of the Proposed Scheme as changing the quality of their neighbourhood and to regard that change as adverse, in diminishing the amenity of the settlement.

8.4.13 The construction of Slag Lane viaduct and Slag Lane realignment will be visible in the vicinity of Saddle Tree Fold and Slag Lane in Little Byrom. Construction noise will be noticeable in outdoor areas and is expected to last for approximately one year and five months. Slag Lane is a designated route for construction traffic to enable access to Slag Lane satellite compound. There will be a significant increase in HGV traffic movements between Manor Avenue and Byrom Lane during the construction period. People in this community are likely to experience these features of the Proposed Scheme as changing the quality of their neighbourhood and to regard that change as adverse, in diminishing the amenity of the settlement.

8.4.14 The A573 Church Street in Golborne is a designated route for construction traffic and is expected to experience a significant increase in HGV traffic movements. This significant HGV traffic effect is expected to combine with significant traffic noise effects on residential properties on Church Street, between Heath Street and B5207 Lowton Road. Some residents

[62] HGV traffic effects are where there is a 30% or more increase in HGV traffic movements which have been identified as significant by traffic and transport. The increase in HGV traffic results in a traffic-related severance effect for non-motorised users. They contribute to neighbourhood quality effects on health resources that are located adjacent to the routes that experience the increase in HGV movements.

are likely to experience these effects as changing the quality of their neighbourhood and to regard that change as adverse, in diminishing the amenity of the settlement.

Access to green space, recreation and physical activity

8.4.15 There is moderate evidence to show that access to green space contributes to good mental health, including reduced stress and improved cognitive function and resilience. There is also moderate evidence that environmental factors such as access to high quality green space, safety and amenity can influence participation in physical activity. Physical activity is strongly linked to health outcomes. A review of published research evidence linking access to green space, recreation and physical activity with health and wellbeing can be found in Volume 5: Appendix HA-002-00000.

8.4.16 The Proposed Scheme will intersect some public rights of way (PRoW) in the Risley to Bamfurlong area. Effects relating to the severance and diversion of PRoW (public footpaths and bridleways) are described in Section 14, Traffic and transport. Surveys of the user numbers and condition of PRoW have been undertaken and are reported in Background Information and Data[63] (see BID TR-004-00001: Transport Assessment policy and data report). Where PRoW and other routes are a 'promoted' destination in their own right as a recreational resource, they are also assessed within the Section 6, Community. Effects on views from PRoW are assessed in Section 11, Landscape and visual effects. PRoW are not identified as sensitive receptors in the assessment of sound, noise and vibration (Section 13) as they are, by their nature, transitory in their use, with users not staying in any one location for any length of time. However, during construction, the amenity and recreational value of some PRoW will be temporarily reduced due to their proximity to construction activities, as well as other aspects such as changes in the length and appearance, and the addition of features such as underpasses. This may result in some people using alternative routes or, where a suitable alternative is not available, being deterred from using PRoW, leading to adverse effects on wellbeing for some individuals. However, the impacts on PRoW are not considered to reduce access to green space and levels of physical activity to a level that would lead to adverse health effects on the population in the Risley to Bamfurlong area.

8.4.17 Construction traffic, including HGVs, will be present on local roads within the Risley to Bamfurlong area as described in Section 14, Traffic and transport. The presence of HGVs is likely to deter some non-motorised users (pedestrians, cyclists and equestrians) from using the affected routes, due to concerns about safety and amenity. In the case of recreational users, it is considered that alternative routes will be available. However, for those using these routes for active travel to work or to access shops and services, there is the possibility that people will choose instead to travel by car, temporarily reducing levels of physical activity and associated health and wellbeing benefits. Given the location of construction traffic routes and the number of HGV movements, it is considered that any reduction in

[63] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data*. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

physical activity would be small and would not lead to adverse health effects on the population in the Risley to Bamfurlong area.

8.4.18 Construction of Culcheth cutting will require the demolition of English Karate Academy in Warehouse Studios on Glaziers Lane. English Karate Academy offers karate classes for children, adults and families at all levels. There are limited alternative facilities in the area: there is one karate school located in Lowton, and four in Warrington. Permanent loss of this facility in this location will reduce the opportunity for beneficial health outcomes achieved through physical exercise and is therefore considered to result in an adverse health effect.

8.4.19 Construction of Lowton cutting will permanently require all 5.6ha of Hesketh Meadows Playing Fields. The playing fields comprise seven football pitches that are used regularly by East Leigh Junior Football Club, a football club for children up to the age of 18. The Club presently has 17 teams (ranging from under sevens to under 18s) and an academy for children aged under six. Additional land at Hesketh Meadows is used for informal recreation by local residents.

8.4.20 An area of land at Cheetham Fold Farm, adjacent to the existing playing fields, has been identified to replace Hesketh Meadows Playing Fields in a like for like manner. By road, the replacement is 700m away from the existing playing fields. Therefore, the identified, replacement land will avoid adverse health effects associated with the permanent loss of Hesketh Meadows Playing Fields and the subsequent reduction in physical activity.

8.4.21 Construction of Lowton North embankment will lead to Byrom Wood being permanently bisected. Byrom Wood is located to the north-east of Golborne and is approximately 27ha of woodland with footpaths offering a 1.5km circular route. The area is accessible via Slag Lane and footpaths provide pedestrian access to each of the four corners of the woodland. The Proposed Scheme will permanently require approximately 4ha of land, south to north through the middle of the woodland. Footpath Golborne 31/10 accommodation underbridge, Footpath Golborne 33/10 underbridge and Critchley culvert will be provided as mitigation to maintain access between both sides of Byrom Wood. During construction, access will be maintained to Byrom Wood. Byrom Hall Wood provides a destination and a waypoint for local walks in the area and opportunities for physical activity. The nearest alternative is Pennington Flash Country Park, which is approximately 1km away. Although the connectivity of the open space will be maintained and therefore still allows for opportunities for recreational activity, it may be that the temporary presence of construction works and the permanent railway infrastructure may deter some visitors, reducing opportunities for health benefits associated with physical activity, and therefore resulting in an adverse health effect.

Education

8.4.22 There is moderate evidence linking low levels of education with poor mental and physical health. The majority of evidence linking education with health outcomes looks at educational attainment in the context of broader socio-demographic status. Educational attainment influences socio-economic factors such as earnings and home ownership, as well as self-

esteem and lifestyle choices. A review of published research evidence linking education with health and wellbeing can be found in Volume 5: Appendix HA-002-00000.

8.4.23 Health and wellbeing effects resulting from impacts on educational facilities are reported in this section. Health and wellbeing effects associated with construction skills and training are assessed in Volume 3, Route-wide effects, Section 8. Significant effects on education facilities resulting from noise are reported in Section 13, Sound, noise and vibration.

8.4.24 Several construction activities are predicted to affect Lowton Junior and Infant School. The A580 East Lancashire Road main compound will be located adjacent to the school, south of the school playing fields. Construction of A572 Newton Road overbridge and Lowton cutting will be located directly to the east of the school buildings and playground and will result in visual impacts. The A572 Newton Road is the sole access to the school and is a designated route for construction traffic, to enable access to A572 Newton Road satellite compound. The construction activity affecting the A572 Newton Road could affect journeys to and from the school and may give rise to concerns about child road safety. The change in the noise environment may affect educational activities within the school for a period of approximately three years and three months. These activities affecting the school may combine to reduce the beneficial wellbeing effects associated with educational attainment.

Social capital

8.4.25 The term 'social capital' refers to 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. The Office for National Statistics[64] 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."

8.4.26 There is moderate evidence for a link between social capital and mental and physical health outcomes. A change in social capital has the potential to influence the mental 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 mental wellbeing or as physiological effects on the body's hormonal and immune systems, with increased susceptibility to mental and physical illness. A review of published research evidence linking social capital with health and wellbeing can be found in Volume 5: Appendix HA-002-00000.

8.4.27 Settlements along the route of the Proposed Scheme support small, well-established communities. The assessment has identified potential wellbeing effects within these

[64] Office for National Statistics (2014), *Measuring social capital*. Available online at: https://webarchive.nationalarchives.gov.uk/20160107115718/http://www.ons.gov.uk/ons/dcp171766_371693.pdf.

communities associated with the temporary construction workforce, which will be substantial relative to the size of these communities. During the day, the workforce will be present on construction sites and compounds throughout the area, including work sites and satellite compounds in the vicinity of the settlements of Culcheth, Lowton, Abram and Bamfurlong. The daily average number of workers at each site will typically be between 40 and 100, and the duration of the works at each site will range from approximately two years and six months to eight years. The presence of construction workers is likely to be noticeable, with construction vehicles using assigned local roads to access compounds, and workers using facilities within local settlements, particularly Culcheth, Lowton, Abram and Bamfurlong.

8.4.28 The introduction of a temporary construction workforce into established communities has the potential to negatively alter people's perceptions of, and interactions with, 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 to implement the framework and provide a first point of contact. 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 Loss of residential properties can cause changes to the social environment within the remaining community. This could involve the direct loss of contacts in the local area and/or a noticeable reduction in the number of people using local facilities. 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. This has been 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 from residential demolitions identified in Section 6, Community, will result in adverse effects on social capital.

8.4.31 The Proposed Scheme will result in the demolition of four properties in the village of Wigshaw. This represents a relatively sizable proportion of the local community. The erosion of social networks resulting from these demolitions will have the potential to reduce social capital, reducing the beneficial health effects that are gained through social contact and support.

Other mitigation measures

8.4.32 HS2 Ltd will engage with local authorities and community representatives to identify measures aimed at fostering and maintaining good relationships between the workforce and local communities. Any measures identified will be included within the community engagement framework as appropriate.

8.4.33 HS2 Ltd will continue to work with WMBC to assist with the process of using land at Cheetham Fold Farm Stables as replacement for the loss of resource at Hesketh Meadows Playing Fields. The provision of this alternative land is required to mitigate loss of land from Hesketh Meadows required to construct the Proposed Scheme.

8.4.34 HS2 Ltd is continuing to engage with Lowton Junior and Infant School to review mitigation measures and determine reasonably practicable methods to mitigate further the noise, visual and construction traffic effects on the staff and students at the school.

8.4.35 HS2 Ltd is continuing to engage with the local community, the Forestry Commission and WMBC to review mitigation measures and determine reasonably practicable methods to mitigate further the severance of the existing permissive circular footpath in Byrom Wood. Such measures will aim to provide new sections of permissive footpath to create a new circular walk in the vicinity of Byrom Wood, on land required for the Proposed Scheme.

Cumulative effects

8.4.36 The assessment has considered whether the cumulative effects of the Proposed Scheme and other committed developments are likely to give rise to additional health effects. No cumulative health effects have been identified.

8.4.37 Cumulative effects may also occur where a number of individual health effects come together within a location, such that a considerable proportion of the population is likely to experience more than one type of health effect. This will place increased stress on those individuals affected and may exacerbate health outcomes associated with the individual effects.

8.4.38 In Wigshaw, the construction of the Proposed Scheme will affect neighbourhood quality and social capital. It is expected that the whole population of Wigshaw will experience impacts on two or more health determinants during the construction of the Proposed Scheme, and this may therefore result in a cumulative effect on health.

8.4.39 In Lowton, the construction of the Proposed Scheme will affect neighbourhood quality and education. It is expected that a small proportion of the population of Lowton will experience impacts on two or more health determinants during the construction of the Proposed Scheme, and this may therefore result in a cumulative effect on health.

8.5 Effects arising from operation

Avoidance and mitigation measures

8.5.1 Consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. Insofar as reasonably practicable, mitigation measures have been incorporated into the design of the Proposed Scheme with the aim of avoiding or reducing

adverse effects on people. The mitigation measures incorporated into the design of the Proposed Scheme in the Risley to Bamfurlong area are described in Section 2 and include:

- landscape mitigation planting and associated earthworks will provide visual screening for residents of properties in Culcheth, Wigshaw, Lowton, Garton Common and Abram, Lowton Junior and Infant School, and users of Byrom Wood; and
- noise fence barriers will provide acoustic screening for residents of properties at Wash End, Lowton Common, Garton Common, Sandy Lane and Byrom Lane.

Assessment of impacts and effects

8.5.2 Impacts on health determinants resulting from the operation of the Proposed Scheme are presented in the health assessment matrix in Volume 5: Appendix HA-001-0MA05. The health assessment criteria are detailed within the SMR. Within the assessment matrix, the assessment criteria are applied to determine which impacts are likely to lead to health and wellbeing effects at population level. These effects are reported in the assessment sections below.

Neighbourhood quality

8.5.3 Noise and visual impacts from passing trains will result in permanent operational impacts on neighbourhood quality in the communities in proximity to the Proposed Scheme, including around Wigshaw. These operational impacts will be experienced alongside permanent construction impacts, including the presence of the Proposed Scheme within the local landscape.

8.5.4 Overhead line equipment and the realigned Wigshaw Lane and overbridge will be visible from Wigshaw. Noise from passing trains and road traffic noise from the realigned road will also be noticeable in the area, particularly along Wigshaw Lane and Robins Lane. Residents living in this area are likely to experience these features of the Proposed Scheme as changing the quality of their neighbourhood. Residents are likely to regard that change as adverse, in diminishing the amenity of the settlement.

Other mitigation measures

8.5.5 Avoidance and mitigation measures are described above. No other mitigation measures have been identified.

Cumulative effects

8.5.6 No cumulative effects have been identified.

Monitoring

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

8.5.8 Proposals for monitoring of precursors to health effects, such as air quality and noise, are reported in Sections 5 and 13.

8.5.9 Any area-specific operational monitoring requirements in relation to air quality effects, noise and vibration effects, traffic effects and visual effects that have contributed to the health assessment are described in the relevant sections of this Volume 2 report.

9 Historic environment

9.1 Introduction

9.1.1 This section of the report provides a description of baseline conditions for heritage assets and the identified impacts and likely significant effects resulting from the construction and operation of the Proposed Scheme within the Risley to Bamfurlong area. Consideration is given to the extent and value of assets including archaeological and palaeoenvironmental remains, historic buildings, the built environment and historic landscape.

9.1.2 Engagement has been undertaken with Historic England, Warrington Borough Council, Wigan Metropolitan Borough Council, Cheshire Archaeology Planning Advisory Service and Greater Manchester Archaeological Advisory Service. The purpose of this engagement has been to discuss the assessment approach, to obtain relevant baseline information and to inform the design development and assessment of the Proposed Scheme.

9.1.3 Appendices and Background Information and Data (BID[65]) reports accompany this section of the report. These are:

- Volume 5: Appendix HE-002-0MA05 – Summary gazetteer, impact assessment table and archaeological character areas;
- Volume 5: Appendix HE-003-0MA05 – Historic landscape character areas;
- Volume 5, Map Book HE-01 and HE-02 – Heritage assets within the study area and Map book HE-03 - Archaeological sub-zones;
- BID HE-001-0MA05 – Historic environment baseline report (including a full gazetteer of heritage assets);
- BID HE-004-0MA05 – Historic environment field survey report (geophysical survey), and Volume 5, Map Book HE-004; and
- BID HE-005-0MA05 – Historic environment remote sensing survey report (aerial photograph and LiDAR[66] assessment), and Map Book HE-005.

9.1.4 Heritage assets have been given a Unique gazetteer identifier (UID), for example MA05_0001. These have been allocated to all heritage assets within the gazetteer and are referenced throughout the ES, BID reports and in map books.

9.1.5 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

[65] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

[66] LiDAR (meaning 'light detection and ranging') is a surveying method that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor, this can be used to identify archaeological earthwork evidence.

Proposed Scheme can be found in the Volume 2, MA05 Map Book. The Proposed Scheme is described in Section 2.

9.2 Scope, assumptions and limitations

9.2.1 The general scope, assumptions and limitations for the historic environment assessment are set out in full in Volume 1, Section 8 and the EIA Scope and Methodology Report (SMR)[67] including the method for determining the value of an asset and magnitude of impact.

9.2.2 The assessment focuses on the extent to which the Proposed Scheme will affect designated and non-designated heritage assets. The Proposed Scheme could impact assets through the alteration, demolition or removal of the asset, or as a result of changes within the asset's setting, where setting contributes to the heritage value of the asset.

9.2.3 The study area for the assessment of effects on designated and non-designated heritage assets is the land required for the construction of the Proposed Scheme plus 500m on each side in rural areas. This is referred to in the remainder of this section as the 500m study area.

Designated heritage assets within a study area of up to 2km from the land required for the construction and operation of the Proposed Scheme have been considered in relation to potential effects arising from changes within an asset's setting. This is referred to in the remainder of this section as the 2km study area. However, the 2km study area is not included in reporting for utilities and/or highway improvement works in instances where there is very limited potential for significant effects from those works beyond the 500m study area. This is the case in the Risley to Bamfurlong area in relation to the highway improvements to the A574 Birchwood Way, Daten Avenue and the A580 East Lancashire Road.

9.2.4 The historic environment methodology includes the consideration of the relevant interactions with other topics, including ecology and biodiversity, landscape and visual, socio-economics, sound noise and vibration, water resources and flood risk, and in-combination climate change impacts. These interactions have been included in the assessment of baseline conditions, impacts and effects.

9.2.5 Where noise is considered, this is within the context of the way in which sound and noise currently contribute to the heritage value 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.

9.2.6 Holcroft Moss is designated as a Site of Special Scientific Interest (SSSI) and is within a Special Area of Conservation (SAC). These are ecological designations and the assessment of effects of the Proposed Scheme in relation to these designations is provided in Section 7, Ecology. Holcroft Moss does not have a heritage designation but has heritage value because

[67] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

of its archaeological interest. This relates to known and potential deposits contained within the moss, dating from the prehistoric to modern period. This section of the report describes the effects of the Proposed Scheme in relation to Holcroft Moss as a non-designated heritage asset.

9.2.7 For the purpose of this assessment, it is generally assumed that heritage assets within the land required for the construction of the Proposed Scheme will be removed. Exceptions to this are linear heritage assets (canals and railways) and Holcroft Moss (MA05_0007) which although partially located within the land required for the construction of the Proposed Scheme will not be removed.

9.3 Environmental baseline

Existing baseline

9.3.1 A full list of data sources used in establishing baseline conditions is provided in BID HE-001-0MA05. In addition to the desk-based assessment, the following surveys have been undertaken in the Risley to Bamfurlong area:

- walkover and site reconnaissance from areas of public access or in locations where site access was granted. This was carried out in order to understand the character of the historic landscape; review the nature, condition and setting of known heritage assets; and identify previously unknown assets;
- desk-top analysis of remote sensing data, including LiDAR and aerial photographs (BID HE-005-0MA05); and
- a programme of non-invasive geophysical survey in areas identified as suitable for this survey method and where access was granted (BID HE-004-0MA05).

Designated assets

9.3.2 Designated heritage assets within the 2km study area are described in Vol 5: Appendix HE-002-0MA05. No designated heritage assets are located partially or wholly within the land required for the construction of the Proposed Scheme.

9.3.3 The assets summarised below are located outside of the land required for the construction of the Proposed Scheme but are partially or wholly within the 2km study area. Only assets where a significant effect is predicted, as described in Section 9.4 and 9.5, are named below:

- one scheduled monument of high heritage value;
- five Grade II* listed buildings, all of which are of high heritage value, including Lightshaw Hall (MA05_0045);
- forty-eight Grade II listed buildings or structures of moderate heritage value, which include Byrom Hall (MA05_0057); 14 farmhouses or associated structures such as barns, 10 churches and assets within their grounds or associated assets; 10 private houses, including Newchurch Old Refectory (MA05_0030) (also known as Newchurch Old Rectory)

and Wigshaw House (MA05_0031); three milestones; three assets located within a cemetery; two pairs of parish stocks; a former school; a memorial; a railway station, a library; and a set of railings; and

- six conservation areas of moderate heritage value.

Non-designated assets

9.3.4 The non-designated heritage assets summarised below lie wholly or partially within the land required for the construction of the Proposed Scheme. Only assets where a significant effect is predicted, as described in Section 9.4 and 9.5, are named below.

9.3.5 There is one non-designated asset of moderate value within the land required for the construction of the Proposed Scheme, the remains of a moss containing potential archaeological evidence. There are no non-designated assets of high heritage value within the land required for the construction of the Proposed Scheme.

9.3.6 There are 14 assets of low heritage value within the land required for the construction of the Proposed Scheme. These date from the Roman, medieval, post medieval and modern periods and relate to domestic, agricultural, industrial and transportation activity in the area. These comprise a Circular cropmark (site of) (MA05_0018), Bamfurlong Hall and moat (site of) (MA05_0094), Lowton Hall (site of) (MA05_0107), Laburnum Cottage (MA05_0127), 188 Newton Road, Lowton, Warrington (MA05_0128), Willowpool, Birchalls Farm and White's Farm (MA05_0129), Glaziers Lane Farm, Culcheth and Swallow Barn, Glaziers Lane (MA05_0130), Moated Enclosure 125m to the north of A580 East Lancashire Road (MA05_0163), Former Field System 225m to the south-east of Aye Bridge Farm (MA05_0164), ROF Risley, Branch of the Great Central Railway (MA05_0165), a Ring Ditch 145m to the north of the A580 East Lancashire Road (site of) (MA05_0176), and three assets including a military accommodation site, a colliery and a colliery railway.

9.3.7 The non-designated heritage assets summarised below lie wholly or partially within the 500m study area.

9.3.8 There is one non-designated asset of high heritage value within the 500m study area, a graveyard.

9.3.9 There are three assets of moderate heritage value within the 500m study area. These comprise prehistoric ring ditches, an enclosure and a parish church.

9.3.10 There are 57 assets of low heritage value within the 500m study area. These include six archaeological sites of settlements with possible medieval origins, cropmarks or earthworks including four moated sites, three collieries, two former mills, ROF Risley, the site of Lowton Common Battlefield, farmhouses, farm buildings, churches or associated memorial structures, private houses, public houses, a set of stocks, a parish hall and transport infrastructure such as milestones and railway branch lines.

Historic environment overview

9.3.11 The bedrock geology of the Risley to Bamfurlong area is largely formed from a number of sandstone formations that are part of the Sherwood Sandstone Group or the Appleby Group. At the northern extent of the study area are Pennine Middle Coal Measures. The bedrock geology has shaped the landscape in this area, which is demonstrated by the historical presence of collieries and their associated infrastructure. Most of the study area is overlain by a superficial geology of glacial till with intermittent areas of glaciofluvial sand and gravel. Alluvium is present along watercourses such as the Hey Brook and there are peat deposits at Holcroft Moss and other low-lying areas.

9.3.12 Evidence for Palaeolithic activity in north-west England is scarce, possibly because much of the region at this time was at the edge of, or under, glacial ice. Climatic warming led to a rise in sea levels and a change in vegetation patterns. Open landscapes were replaced by areas of woodland habitat and species such as arctic hare and reindeer gave way to boar and deer. Mesolithic hunter-gatherer societies began to develop and allowed for the subsequent emergence of the early agricultural societies in the Neolithic period. Although there are no recorded assets of this period within the study area, peat deposits such as Holcroft Moss (MA05_0007) have the potential to contain artefacts and palaeoenvironmental material dating from the Palaeolithic and Mesolithic periods. These wetlands were utilised for a range of resources such as fish and wildfowl that drew people to the local area throughout the prehistoric period.

9.3.13 Palaeoenvironmental evidence from within peat layers at Holcroft Moss (MA05_0007) indicate that woodland clearance began to take place in the Neolithic period and continued into the Bronze Age. This happened during the development of settled farming in the area. Archaeological evidence from this period is rare in the study area and, although there is evidence of isolated findspots around Culcheth, these cannot be dated accurately to the Neolithic period. By the Late Neolithic or the Early Bronze Age there were farming settlements to the south of the study area as shown by environmental remains from the former Warburton Moss located in the Broomedge to Glazebrook area (MA04).

9.3.14 During the Iron Age the climate became cooler and wetter, with an expanding population necessitating the intensification of agricultural practices. This led to the use of marginal land which resulted in large-scale land clearance throughout the area. The area of the River Mersey was controlled by tribal groups called the Brigantes and Cornovii. The first settlement evidence in the wider area is the Iron Age promontory fort located south of the River Mersey at Great Woolden Hall (MA04_0142). There is very limited settlement evidence in the study area north of the River Mersey for this period. Assets such as Ring Ditch 145m to the north of the A580 East Lancashire Road (MA05_0176) and Circular Cropmark (MA05_0018) were identified by aerial survey and potentially indicate prehistoric settlement. There is also potential for Iron Age archaeological evidence to survive in the large alluvial river terrace deposits around Culcheth and Glazebury.

9.3.15 Although Britain came under Roman control after AD 43 it was not until AD 70 that the Romans began to occupy the area of Cheshire and Greater Manchester. Roman military forts

were present at Wigan, Manchester, Wilderspool and Walton-le-Dale (Preston) connected by Roman roads. There were civilian settlements such as Wilderspool, south of Warrington which specialised in pottery manufacture. It is possible that coal mined from the Wigan coalfields was used to fire the kilns. This would likely have been mined at a shallow depth close to the surface, although there is no clear evidence of this in the study area. Outside the study area, there was continued occupation of Iron Age sites into the Roman period such as at Great Woolden Hall and Winwick, north of Warrington. However, there is little archaeological evidence for settlements in the study area which indicates they were probably restricted to isolated indigenous settlements or farmsteads. Other archaeological evidence for the Roman period is limited to findspots. The study area is likely to have formed part of the rural and agricultural hinterland for settlements at Wigan and Warrington.

9.3.16 After the withdrawal of Roman rule in the 5th century AD, the region fragmented into smaller kingdoms. Mercia, Northumbria and finally Wessex controlled the region between the 7th and 10th centuries. In the early medieval period, archaeological evidence becomes increasingly scarce, and knowledge of the period is largely dependent on documentary sources. The Domesday survey of 1086 only records a single settlement in the study area at Newton (Le-Willows) that may have originated in the early medieval period.

9.3.17 In the medieval period the settlement pattern in the study area was a mix of villages such as Bamfurlong and Lowton, small hamlets and isolated farms. The manorial system was the organising principle of the study area at this time, where the legal and economic power were vested in a lord of the manor. Emerging medieval settlements with manors in the study area include Lowton, Culcheth and Golborne. Moated sites were built from the 12th to 14th centuries and consisted of a rectangular, circular, or square moat surrounding an island that normally contained a hall. There is a notable concentration of moated sites around the Wigan and Leigh area. These sites include, Bamfurlong Hall and moat (site of) (MA05_0094), Lightshaw Hall (MA05_0045), Byrom Hall (MA05_0057), Lowton Hall (MA05_0107) and a Moated Enclosure 125m to the north of A580 East Lancashire Road (site of) (MA05_0163). Bamfurlong Hall and moat (site of) and Lightshaw Hall are focused on the Hey Brook and may have been moated for drainage purposes. However, the purpose of other moats is not entirely clear, but they are more likely to have been for security or an expression of social standing rather than for defence.

9.3.18 The peat mosses across the south of the study area, including Holcroft Moss, Risley Moss, Glazebrook Moss and Pestfurlong Moss, played an important role for seasonal pasture, hunting and peat cutting for fuel in this period. Coal mining also began in the medieval period when accessible coal seams were mined from the surface using shallow pits. Medieval coal mining would have been on an organised level, rather than on an ad hoc basis, as was the case in earlier periods. However, there is no evidence for this type of mining in the area as it is likely to have been subsumed by later post-medieval coal mining.

9.3.19 A key characteristic of the onset of the post-medieval period was the extension and intensification of agricultural activity such as pasture based dairy farming. During the early part of the period involvement in agriculture formed the employment of most working people. Land associated with medieval manors was reorganised from the 16th century with

land enclosure taking place throughout England. An example of this within the study area includes a Former Field System 225m to the south-east of Aye Bridge Farm (MA05_0164). Dairy farming in the study area also greatly increased as Manchester expanded leading to a greater demand for dairy products such as milk and cheese. This led to the enclosure of waste land, common land and other marginal areas as a result of population pressure and technological innovations in agricultural practice. New farms were built including Glaziers Lane Farm, Culcheth and Swallow Barn, Glaziers Lane (MA05_0130), Laburnum Cottage (MA05_0127) and Willowpool, Birchall's Farm and White's Farm (MA05_0129). The peat mosses underwent great change as part of this process, with intensive drainage and improvement. Night soil, which is collected human excreta, from Manchester was often added as fertiliser. Holcroft Moss (MA05_0007) is thought to be the only known example in Cheshire that has never been cut for peat or experienced agricultural improvements.

9.3.20 At the start of the post-medieval period there were numerous small coal mines around Wigan. Technological advances from the 18th century, including the invention of the beam engine which was a type of steam engine that pumped water out of mines, allowed for the working of deeper and wetter seams. This increased the production of the coal fields of Wigan and Manchester. The presence of the coal fields, textile production and the general growth of industry in Manchester led to the creation of transport links such as the wagonway, which was a pre-cursor to the railway. The Bridgewater Canal (MA04_0082), the first canal to be constructed without the presence of a pre-existing watercourse, was opened in 1759. In 1820, further construction linked it to the Leeds and Liverpool Canal (MA05_0116) at Leigh. The Liverpool to Manchester Line (Chat Moss) railway opened in 1830, once the difficulties of passing through Chat Moss to the east had been overcome. Towns in the study area prospered and expanded as a result of the advance of the coal mining industry. The town of Golborne developed significantly as a direct result of coal mining in the area.

9.3.21 The coal industry continued to grow in the modern period with approximately 50 mines operating in Wigan. Although the infrastructure has often been removed, their former existence can be noted through the presence of features, such as spoil heaps, and former colliery railway sidings like those at Edge Green (MA05_0112) in the study area. In the early 20th century and the inter-war period, industry entered a phase of decline due to a general economic depression and shrinking world markets. Despite this decline it was an important era in housebuilding. Improved roads and rail links allowed people to live away from the city cores and workplaces. The construction of the M62 and the Birchwood motorway links enabled large-scale out of town developments. Birchwood Park, partially within the study area, was the former filling site of ROF Risley (MA05_0124). ROF Risley was one of several filling factories founded during the Second World War, where munitions were filled with explosives and assembled. At the end of the war the munitions factory was closed. Part of the filling factory became the site of the UK'-s fledgling nuclear weapons and power programme. However, large areas of the site became derelict and remained undeveloped. In the 1960s, the site was incorporated into a plan to expand Warrington. Many areas of the factory site were demolished, likely in the 1960s, and large areas of housing were developed within the footprint of the site, with direct links to the M62.

Future baseline

Construction (2025)

9.3.22 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. The following committed development of relevance to historic environment assessment that would materially alter the future baseline during construction of the Proposed Scheme in this area, are set out in Table 17.

Table 17: Committed developments of relevance to historic environment assessment during construction

Map book reference[68]	Planning reference	Description	How this is considered in the assessment
MA05/362	2020/37646	Location: Wigshaw House, 110 Wigshaw Lane, Warrington, WA3 4AB. Full Planning - Proposed conversion and change of use of redundant barn to single residential dwelling, alterations to existing vehicular access and the creation of a residential curtilage.	Informing future baseline.

9.3.23 This committed development lies partially with the land required for the Proposed Scheme. The dwelling forms part of the future baseline for the assessment of effects on historic environment during construction of the Proposed Scheme.

Operation (2038)

9.3.24 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No additional committed developments of relevance for historic environment have been identified that would materially alter the future baseline in this area.

9.4 Effects arising during construction

Avoidance and mitigation measures

9.4.1 The design of the Proposed Scheme has sought to avoid adverse effects on heritage assets within the land required for construction insofar as reasonably practicable.

[68] Volume 5, Planning Data/Committed Development Map Book: Maps CT-13-314b to CT-13-318.

9.4.2 Section 8 of the draft Code of Construction Practice[69] sets out the measures that will be adopted, insofar as reasonably practicable, to control effects on heritage assets. These include:

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

9.4.3 The following design measures have also been included to reduce impacts on heritage assets in the Risley to Bamfurlong area:

- landscape mitigation planting on the west side of the realigned A574 Warrington Road to the east of Newchurch Old Refectory (also known as Newchurch Old Rectory) (MA05_0030) and to the north of the asset on the south edge of the Wigshaw Lane realignment; and
- landscape mitigation planting to the south and west of Wigshaw House (MA05_0031).

Assessment of impacts and effects

9.4.4 Impacts on all heritage assets described above have been assessed and are set out in the Impact Assessment Table (Volume 5: Appendix HE-002-0MA05). Only impacts on heritage assets resulting in significant effects are described in the assessment set out below. Effects on Historic Landscape Character Areas are set out in Volume 5: Appendix HE-003-0MA05, and again only the significant effects are described below.

Temporary effects

9.4.5 The temporary construction works, such as excavations and earthworks for construction compounds, storage areas, and diversions of existing roads and services, have the potential to affect heritage assets during the construction period. Heritage assets could be affected as a result of changes within the assets' settings, where setting contributes to the heritage value of the asset. The duration of the activities giving rise to the temporary effect described below are set out in the indicative construction programme in Section 2.3.

9.4.6 The following significant effects are expected to occur as a result of temporary impacts on designated or non-designated heritage assets due to changes that affect the contribution made by setting to the asset's heritage value.

9.4.7 Newchurch Old Refectory (also known as Newchurch Old Rectory) (MA05_0030) is a Grade II listed building of moderate heritage value. It is located on the existing A574 Warrington Road, to the south of Culcheth, and is approximately 25m to the west of land required for

[69] Volume 5: Appendix CT-002-00000, Draft Code of Construction Practice.

the construction of the Proposed Scheme. The former rectory dates from 1812. The asset derives its heritage value from its historic interest, as a rectory serving the surrounding parishes of Culcheth and Croft. The rectory was built in a rural location between the two villages that it served, despite the availability of space within Culcheth. It is separated from the expansion of Culcheth to the north and east by the former Wigan Branch line of the Great Central Railway (now Culcheth Linear Park) (MA05_0115). The setting of the rectory has a degree of seclusion and peacefulness, due to its large garden defined by boundaries of trees and tall hedgerows, set back from the A574 Warrington Road. The sense of enclosure is increased by a small copse of trees opposite the house to the east of the A574 Warrington Road. These will be removed to allow for the construction of the Proposed Scheme. The asset retains views out to the west and south-west over agricultural land which form part of its setting. The setting of the asset positively contributes to its heritage value as it retains its garden and historic rural location between Culcheth and Croft. The use of construction machinery in the immediate vicinity of the asset will increase noise and movement in the setting to the east of the house. Some movement from construction machinery will be partially screened by the boundary trees to the east of the asset. Despite this, the increased noise and movement will have an adverse impact on the heritage value of the asset. This will constitute a medium impact resulting in a moderate adverse significant effect.

9.4.8 Wigshaw House (MA05_0031) is a Grade II listed asset of moderate heritage value. The house is approximately 10m from land required for the construction of the Proposed Scheme. The heritage value of the asset is derived from its architectural interest as a relatively unaltered, early 19th century Georgian house. The asset is prominently located at the junction of Wigshaw Lane and Glaziers Lane, with its principal façade facing the road. It is on the edge of a small rural hamlet, which has remained separate from nearby Culcheth due to the presence of the former Wigan Branch Line of the Great Central Railway to the north-east. The setting of the house is formed by its garden, within which the house is set away from the road behind low boundaries such as short hedges, stone walls and gate posts. The committed development MA05/362 will convert the adjacent barn into a residential property, but this alteration will be in keeping with the existing setting. To the west there are views from within the garden towards agricultural land, which further contribute to the heritage value of the asset by expressing its rural character. Construction activities will occur in the agricultural land, within 10m to the west of the asset, and the use of construction machinery will disrupt the rural character of the asset and alter the experience of the asset within its setting. This will constitute a medium impact resulting in a moderate adverse significant effect.

9.4.9 Byrom Hall (MA05_0057) is a Grade II listed building of moderate heritage value. It is located to the west of Slag Lane and approximately 12m to the north-east of land required for the construction of the Proposed Scheme. The asset derives its heritage value from its architectural interest, due to its distinctive appearance, visual prominence and original internal features. Its setting is to the west of Slag Lane behind a large lawn and a paddock. The principal elevation of the asset faces to the east, with views across Slag Lane to pasture and a tree belt lining the Hey Brook. The surrounding flat topography is relatively featureless allowing Byrom Hall visual prominence which positively contributes to the heritage value of

the asset. The asset retains views to the Hey Brook, and the archaeological remains of Mossley Hall Moat (site of) (MA05_0101), which has a historic association with Byrom Hall. The setting will be altered by the presence of construction machinery in the farmland to the east of the asset during construction of Lowton North embankment. There will be a significant increase in movement of traffic due to the high volume of construction vehicles that will be present to the east and south of the asset. Long-range views to the south and east will be altered due to the presence of construction machinery and Slag Lane satellite compound, which will change the way the asset is experienced within its setting and affect its heritage value. Utility works to the north and east of the asset will also foreshorten views from the asset. This will constitute a medium adverse impact resulting in a moderate adverse effect.

9.4.10 Lightshaw Hall (MA05_0045) is a Grade II* listed building of high heritage value. It is located approximately 45m to the north of land required for the construction of the Proposed Scheme. The asset derives its heritage value from its architectural and archaeological interest, as a 16th century timber-framed farmhouse and moated site. The house was largely rebuilt in the 18th and 19th centuries and the moat has been mostly infilled. Its setting is within a garden, in a group of farm buildings located to the immediate north of the quiet Lightshaw Lane. It is surrounded by extensive agricultural land, consisting of large land parcels, which undulate and slope down toward Hey Brook to the north, and form a small plateau to the south. The surrounding farm buildings and farmland form the historic context and the current peaceful rural setting of the farmhouse and positively contribute to understanding and appreciating the heritage value of the asset. The presence of construction machinery to the south of the asset, and the associated increase in noise within its setting, will be in contrast to its current peaceful rural character, altering the way the asset is experienced and impacting its heritage value. This will constitute a low adverse impact resulting in a moderate adverse effect.

Permanent effects

9.4.11 Permanent construction phase effects can occur either as a result of physical impacts on heritage assets within the land required for the construction of the Proposed Scheme, or through changes to the setting of heritage assets that affect the contribution made by setting to the asset's heritage value.

9.4.12 The following significant effects will occur as a result of permanent physical impacts on heritage assets within the land required for the construction of the Proposed Scheme.

9.4.13 An undated cropmark enclosure (MA05_0018), is a non-designated asset of low heritage value. It is located north of the M62, within the land required for the construction of the Proposed Scheme. The asset derives its heritage value from its archaeological interest as an example of an enclosure which may be associated with human settlement or agricultural activity. The asset will be removed during construction. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.14 Glaziers Lane Farm, Culcheth and Swallow Barn, Glaziers Lane (MA05_0130) is a non-designated asset of low heritage value. The asset comprises a farmhouse (Glazier Lane Farm) and a rectangular brick barn (Swallow Barn), which are within a larger farm complex. The asset derives its heritage value from its historical and architectural interest as 19th century farm buildings. They are located within the land required for the construction of the Proposed Scheme and will be demolished during construction of Culcheth cutting. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.15 Willowpool, Birchalls Farm and White's Farm (MA05_0129) are a non-designated asset of low heritage value. The asset comprises three early 19th century farmhouses which have modern alterations. It does not include the associated modern farm buildings. The farmhouses derive their heritage value from their historical and architectural interest as 19th century vernacular farm buildings. They are located within the land required for the construction of the Proposed Scheme and will be demolished during construction of Lowton cutting. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.16 The ring ditch 145m to the north of the A580 East Lancashire Road (MA05_0176) is a non-designated asset of low heritage value. The asset derives its heritage value from its archaeological interest as a possible prehistoric enclosure. It is located within the land required for the construction of the Proposed Scheme and will be removed during construction. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.17 The site of 17th century Lowton Hall (MA05_0107) and associated former landscape elements is a non-designated asset of low heritage value. The asset derives its heritage value from its archaeological interest as evidence of the former hall and landscape. It is located within the land required for the construction of the Proposed Scheme and will be removed during construction of Newton Road accommodation access. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.18 188 Newton Road, Lowton, Warrington (MA05_0128) is a non-designated asset of low heritage value. It is a large former vicarage dating from the 19th century. The asset derives its heritage value from its historic and architectural interest as an example of a post-medieval vicarage. It is located within the land required for the construction of the Proposed Scheme and will be demolished during construction of Lowton cutting. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.19 Laburnum Cottage (MA05_0127) is a non-designated asset of low heritage value. The asset is a large farmhouse with some modern alterations and derives its heritage value from its historical and architectural interest as a 19th century farmhouse. It is located within the land required for the construction of the Proposed Scheme and will be demolished during construction of Slag Lane viaduct. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.20 The moated enclosure 125m to the north of the A580 East Lancashire Road (MA05_0163) is a non-designated asset of low heritage value. The asset derives its heritage value from its archaeological interest as the site of a possible prehistoric ring ditch or medieval moated

site. It is located within the land required for the construction of the Proposed Scheme and will be removed during construction. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.21 The former field system 225m to the south-east of Aye Bridge Farm (MA05_0164) is a non-designated asset of low heritage value. The asset derives its heritage value from its archaeological interest as the remains of an undated field system. It is located within the land required for the construction of the Proposed Scheme and will be removed during construction. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.22 Bamfurlong Hall and moat (site of) (MA05_0094) is a non-designated asset of low heritage value. The asset derives its heritage value from its archaeological interest as the surviving remains of the former medieval hall and the associated, partially infilled, moated site at Bamfurlong. It is located within the land required for the construction of the Proposed Scheme and will be removed to enable the establishment of Bamfurlong satellite compound. This will constitute a high adverse impact and a moderate adverse significant effect.

9.4.23 The following significant effects are predicted as a result of permanent impacts on designated or non-designated heritage assets due to changes to their settings.

9.4.24 Views to the east from Newchurch Old Refectory (also known as Newchurch Old Rectory) (MA05_0030) will be permanently altered by the construction of A574 Warrington Road overbridge despite some screening afforded by the trees at the boundary of the asset. To the west of the asset, the construction of Culcheth Link Road will result in the loss of agricultural land and changes to the rural views. The views, agricultural landscape and secluded location form part of the historic context. The asset was deliberately built in this location in order to serve the parishes of Culcheth and Croft. The rural outlook remains to the west of the asset. The asset is currently enclosed to the east by hedgerows and trees, with a small copse of trees beyond. These will be removed by the construction of Proposed Scheme. The quiet secluded character to the east will be replaced by the A574 Warrington Road, while to the west the Culcheth Link Road will introduce new road infrastructure and traffic. This will impact the ability to appreciate the asset and the enclosed secluded setting as it becomes surrounded by rail and road transport links. This will constitute a medium adverse impact and a moderate adverse significant effect.

9.4.25 The southern boundary of the garden of the Grade II listed Wigshaw House (MA05_0031), as described under temporary effects above, is within the land required for the construction of the Proposed Scheme. The construction of Culcheth cutting will result in the demolition of parts of the surrounding hamlet including Glazier Lane Farm and Swallow Barn (MA05_0130) to the south. The cutting and Wigshaw Lane realignment will also remove the southern part of the garden and fields to the south. This will alter an element of the setting which contributes positively to the heritage value of the asset. Landscape mitigation planting will partially screen the presence of Culcheth cutting. Despite this, the loss of agricultural land and adjacent buildings will alter the rural character of the surrounding hamlet and reduce

the contribution made by the setting to the asset's heritage value. This will constitute a medium adverse impact and a moderate adverse significant effect.

9.4.26 Lowton North embankment is located approximately 230m to the south-west of the Grade II listed Byrom Hall (MA05_0057), as described under temporary effects above. The land to the south-west of the asset will be permanently altered with the route of the Proposed Scheme becoming a dominant feature of the landscape. The altered highway alignment associated with Slag Lane viaduct will be located 75m to the east of the asset beyond Slag Lane. The presence of Slag Lane viaduct and the associated highway realignment will truncate views from the principal elevation of Byrom Hall towards the east and south-east. The loss of views to Hey Brook will consequently reduce the relationship with Mossley Hall moated site. There will be landscape mitigation planting to the south, west and east of the asset. This will reinstate the visual effect of a tree line within the view and block views of the Proposed Scheme from the asset when the planting has matured. However, this will not prevent the adverse impact to the heritage value of the asset as a result of the change to a key part of its setting. This will constitute a medium adverse impact and a moderate adverse significant effect.

9.4.27 Lightshaw Hall (MA05_0045), as described under temporary effects above, is located approximately 245m to the north of the route of the Proposed Scheme and to the immediate north of the quiet Lightshaw Lane. The setting (as described above) will be altered by the construction of the Proposed Scheme. The long-range views out over the gently undulating agricultural land to the south, an element of the setting of the farmhouse which contributes to its heritage value, will be foreshortened by both the construction of Lowton North embankment and A573 Wigan Road viaducts. Much of the agricultural land to the south of Lightshaw Lane will be used for the creation of a new ecological habitat of grassland and ponds. The loss of the adjacent farmland will alter the immediate agricultural setting of the asset that provides the context for the farmhouse. However, the creation of the new ecological habitat will be in keeping with the existing landscape of agricultural fields. This will constitute a low adverse impact and a moderate adverse significant effect.

Other mitigation measures

9.4.28 Potential opportunities for further mitigation measures will continue to be considered through detailed design to reduce further the significant effects described above where practicable. These may include the identification of:

- suitable locations for advance planting, to reduce the effects of changes within the assets' setting where setting contributes to the heritage value of the asset; and
- locations where the physical impacts on heritage assets can be reduced through the detailed design of the works.

Summary of likely residual significant effects

9.4.29 The temporary effects of construction activity on the setting of heritage assets have been considered. However, as these effects result from temporary construction activities they are restricted to the duration of those activities and are reversible.

9.4.30 Specific mitigation measures have been incorporated as set out above and taken into account during assessment. Therefore, the residual effects are the same as those reported under permanent construction phase effects.

Cumulative effects

9.4.31 No cumulative effects on heritage assets during construction have been identified in the Risley to Bamfurlong area.

9.5 Effects arising from operation

Avoidance and mitigation measures

9.5.1 Some of the design measures, as shown on the Map Series CT-06 within the Volume 2, MA05 Map Book, could reduce the operational impacts and effects on heritage assets:

- noise mitigation measures have been included within the Proposed Scheme that will reduce potential impacts on Wigshaw House (MA05_0031); and
- over time, landscape mitigation planting will progressively reduce the effect of changes within the assets' setting within the study area as it matures at Newchurch Old Refectory (MA05_0030) and Wigshaw House (MA05_0031).

Assessment of impacts and effects

9.5.2 The assessment considers the Proposed Scheme once operational; all effects are permanent.

9.5.3 During the operation of the Proposed Scheme no further ground works are anticipated. 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 arising from changes in their settings due to the presence of the Proposed Scheme are reported as permanent construction effects. These effects are not repeated but will continue throughout the operation of the Proposed Scheme.

9.5.5 It is predicted that there will be no additional significant effects on these assets during operation.

Other mitigation measures

9.5.6 No additional operational mitigation measures beyond those included within the Proposed Scheme design have been identified. Potential opportunities for further mitigation such as additional planting and noise fencing will be considered as part of the detailed design process.

Summary of likely residual significant effects

9.5.7 No mitigation beyond that described above has been identified. As a result it is currently anticipated that residual effects will be the same as those reported in the assessment of effects during operation.

Cumulative effects

9.5.8 No cumulative effects on heritage assets during operation have been identified in the Risley to Bamfurlong area.

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.

10 Land quality

10.1 Introduction

10.1.1 This section of the report presents the baseline conditions along the route of the Proposed Scheme in the Risley to Bamfurlong area in relation to land quality and reports the likely impacts and significant effects resulting from construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, historical, mining and mineral exploitation or mineral resources point of view including geological Sites of Special Scientific Interest (SSSI) and Local Geological Sites (LGS), and areas of designated mineral resources. Consideration is also given to petroleum (including gas) prospects and licensing.

10.1.2 Engagement has been undertaken with, the Coal Authority, Warrington Borough Council (WBC), Wigan Metropolitan Borough Council (WMBC), the Environment Agency, the Animal and Plant Health Agency (APHA) and local geological interest groups. 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.

10.1.3 Details of baseline information, conceptual site models (CSM) and risk assessments are outlined in Volume 5: Appendix LQ-001-0MA05. Baseline data relating to land quality are presented on Maps LQ-01-314b to LQ-01-318 (in the Volume 5, Land quality Map Book).

10.1.4 Maps showing the location of the key environmental features (Map Series CT-10), 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, MA05 Map Book.

10.1.5 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding water 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).

10.1.6 The Proposed Scheme is described in Section 2.

10.1.7 All distances, lengths and area measurements in this section are approximate.

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 EIA Scope and Methodology Report (SMR)[70].

[70] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

10.2.2 In accordance with the SMR, a risk-based approach was undertaken to identify contamination that may have an impact in relation to construction of the Proposed Scheme. To support this, a desk-based assessment has been undertaken for the study area, defined as the land required for the construction of the Proposed Scheme plus a 250m buffer. In the case of groundwater abstractions, this buffer is increased to 1km.

10.2.3 For major above ground utilities, a pre-screening exercise has been completed to determine where these may break ground, or otherwise interact with land quality. In such cases, these are considered in the land quality assessment.

10.2.4 The majority of new and diverted minor utilities will 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 CSM approach. The lack of contact with nearby potentially contaminated sites, the usual approach to ensuring services are protected from contamination by design and choice of materials and the absence of sensitive receptors within the roadways, reduces the risk of an impact occurring. The potential impacts 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.

10.2.5 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.

10.2.6 The location of the Proposed Scheme was viewed from points of public access initially. In addition, and where permission could be obtained, visits to some key sites have been undertaken to verify desktop information. The details of site visits are provided in the Background Information and Data (BID) LQ-002-0MA05[71].

10.2.7 A CSM approach has been used to provide an understanding of the sources and 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.

10.2.8 The minerals assessment is based upon the mineral resources[72] identified in published mineral plans, and existing planning or licensed areas. Any inference of minerals provided

[71] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background and Information Data, Land quality baseline data*, BID LQ-002-0MA05. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

[72] Defined in the SMR as 'mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction and Development Licences (PEDL), Shale Prospective Area (SPA)'.

by geological maps/reports is excluded (except where these are covered by a published mineral plan).

10.2.9 The geoconservation assessment is based upon local authority and publicly available local geological trust records.

10.3 Environmental baseline

Existing baseline

10.3.1 Baseline data have been collected from a range of sources including Ordnance Survey mapping, the British Geological Survey (BGS), Coal Authority, Oil and Gas Authority (OGA), WBC, WMBC, Public Health England, the Environment Agency, Natural England and APHA records, as well as online sources such as local geological trusts. Further details are given in Volume 5: Appendix LQ-001-0MA05 and Background Information and Data (BID) LQ-002-0MA05 and presented in Maps LQ-01-1-314b to LQ-01-318 (Volume 5, Land quality Map Book).

Geology

10.3.2 This section describes the underlying ground conditions within the Risley to Bamfurlong area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate[73].

10.3.3 Table 18 provides a summary of the geology (made ground, superficial and bedrock units) in the study area.

Table 18: Summary of the geology underlying the land quality study area

Category	Geology	Distribution	Formation description	Aquifer classification
Made ground	Made ground	BGS mapping[74] identifies three areas of made ground within the study area all located to the west of the land required for the construction of the Proposed Scheme between Edge Green and Ince Moss. The three areas relate to the location of former collieries; Bamfurlong, Mains Green and Edge Green. Made ground may be present elsewhere where land has been previously developed or infilled.	Made ground comprising variable deposits of reworked natural and man-made materials.	Not designated

[73] British Geological Survey (2014), *Lithostratigraphy of the Sherwood Sandstone*. Available online at: http://pubs.bgs.ac.uk/publications.html?pubID=B07318.

[74] British Geological Survey (2019), *BGS Geology 50k DiGMapGN-50 WMS, superficial deposits and bedrock geology*. Available online at: https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/.

Category	Geology	Distribution	Formation description	Aquifer classification
Superficial	Head	Small area in the north-east of the study area to the west of Abram Brow.	Clay, silt, sand and gravel	Secondary A (undifferentiated)
Superficial	Alluvium	Beneath the north-eastern part of the study area and following the course of Hey Brook from west of Platt Bridge to Pennington Flash and a small area just to the north of the A580 East Lancashire Road near Pocket Nook.	Clay, silts, sand and gravel	Secondary A (small, mapped area to north of A580 East Lancashire Road is classified as unproductive strata).
Superficial	Lacustrine	On the western boundary of the study area between Kenyon Farm and Lane Head.	Clay and silt	Unproductive strata
Superficial	Peat	Southern end of the study area from Glazebrook Moss to approximately 600m north of the M62 and one smaller area at the north-western end of the study area west of Platt Bridge.	Organic, partially de-composed vegetation	Unproductive strata
Superficial	Glaciolacustrine deposits	Two areas of these deposits are mapped, between Culcheth and Yew Tree Farm and a further area to the north of the A580 East Lancashire Road south of Lowton Common. Other minor areas exist south of Broseley Bridge and south-east of Taylor Business Park.	Lake bottom and shore sediments in lakes composed of coarse-grained bedload and suspended fine-grained material.	Unproductive strata
Superficial	Glaciofluvial ice contact deposits	To the south of Kenyon in the centre of the study area.	Glaciofluvial deposits consisting of sand and gravel.	Secondary A
Superficial	Glaciofluvial/ glaciofluvial sheet deposits	Intermittent areas of these deposits on the eastern and western edges of the land required for the construction of the Proposed Scheme, south-east of Culcheth, and at the northern end of the study area north of Bamfurlong.	Sand and gravel	Secondary A, a small mapped area at northern end of study area is classified as Secondary (Undifferentiated) driven by the presence of the dominant glacial till deposits in the area.

Category	Geology	Distribution	Formation description	Aquifer classification
Superficial	Glacial till	Mapped under most of the study area and potentially present under younger superficial deposits described above.	Sandy silty clay with gravel.	Secondary (Undifferentiated). South of the A580 East Lancashire Road to approximately the location of the A574 Warrington Road the superficial deposits have been classified as unproductive strata.
Bedrock	Mercia Mudstone Group – Tarporley Siltstone Formation	South western corner of the study area, south of the M62.	Siltstone	Secondary B
Bedrock	Sherwood Sandstone Group – Helsby Sandstone Formation	From the south of the study area to 680m north of the M62.	Pebbly sandstone	Principal
Bedrock	Sherwood Sandstone Group – Wilmslow Sandstone Formation	From 680m north of the M62 to the A580 East Lancashire Road.	Sandstone	Principal
Bedrock	Sherwood Sandstone Group - Chester Formation	From the A580 East Lancashire Road to the A573 Wigan Road.	Sandstone	Principal
Bedrock	Kinnerton Sandstone Formation[75]	Thin band west of the A573 Wigan Road.	Sandstone	Principal
Bedrock	Cumbrian Coast Group - Manchester Marls Formation	West of the A573 Wigan Road to Aye Bridge Farm.	Mudstone, siltstone and sandstone, interbedded	Secondary B
Bedrock	Appleby Group -Collyhurst Sandstone Formation	Aye Bridge Farm to Bamfurlong.	Sandstone	Principal

[75] Recent updates to the nomenclature used to describe these formations have removed the Kinnerton Sandstone Formation from the Sherwood Sandstone Group. British Geological Survey (2014), *Lithostratigraphy of the Sherwood Sandstone*. Available online at: https://core.ac.uk/download/pdf/20539031.pdf.

Category	Geology	Distribution	Formation description	Aquifer classification
Bedrock	Pennine Coal Measures Group - Pennine Middle Coal Measures Formation	Bamfurlong to the northern end of study area. In an isolated patch around Platt Bridge.	Mudstone, coal seams, siltstone and sandstone	Secondary A aquifer

10.3.4 There are a number of faults in the north of the study area which generally trend north-east to south-west. Faults which cross the land required for the Proposed Scheme are located:

- east of Glaziers Lane Farm, running in a north-west to south-east orientation; and
- in the vicinity of Lowton Common in the centre of the study area, the north-south trending Great Haigh Fault.

10.3.5 Based on local authority records, no farm burial or pyre sites associated with the 1967/8 and 2001/2 outbreaks of foot and mouth disease (FMD) are known to be present within the Risley to Bamfurlong area. However, the 2001/2 FMD outbreak risk assessment map[76] identifies the study area to lie within an 'at risk county'. In addition, older unrecorded sites may be present from the 1967 outbreak. Similarly, anthrax infected cattle burial sites may be present, generally relating to burials over 50 to 100 years ago. However, no records have been found of such burials. In all cases, the records do not provide an exact location for the burial or pyre sites and other, unrecorded sites may be present.

Radon

10.3.6 Radon is a radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. The occurrence of radon gas is shown in the BGS Radon Potential Dataset[77].

10.3.7 All of the study area lies within a lower probability radon area, where less than 1% of homes are estimated to be at or above the action level of 200 becquerels per cubic metre of air (Bq/m^3) for residential properties.

Groundwater

10.3.8 Five aquifer designations have been identified within the study area, as defined by the Environment Agency. These are as follows:

- the Helsby Sandstone Formation, Wilmslow Sandstone Formation, Chester Formation, Kinnerton Sandstone Formation and the Collyhurst Sandstone Formation are designated as Principal aquifers;

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

[77] British Geological Survey (BGS) and Public Health England (2011), *Radon data: Radon potential dataset*. Available online at: http://www.bgs.ac.uk/radon/hpa-bgs.html. This dataset underpins Public Health England (2007), *Indicative Atlas of Radon in England and Wales*. Available online at: www.ukradon.org/information/ukmaps.

- the Middle Coal Measures Formation, head, majority of alluvium, glaciofluvial ice contact deposits and the glaciofluvial/glaciofluvial sheet deposits are designated as Secondary A aquifers;
- the Manchester Marls Formation and the Tarporley Siltstone Formation are designated as Secondary B aquifers;
- the majority of glacial till is designated as a Secondary (Undifferentiated) aquifer; and
- the peat, glaciolacustrine deposits, lacustrine deposits, a discrete area of alluvium in the northern end of the study area (where glacial till deposits are dominant) and the area of glacial till to the south of the A580 East Lancashire Road, are designated as unproductive strata.

10.3.9 Table 19 sets out the groundwater designations and abstractions in the land quality study area of 1km from the land required for construction of the Proposed Scheme in the Risley to Bamfurlong area.

Table 19: Groundwater designations and abstractions in the land quality study area

Feature	Details
Source Protection Zones (SPZ) associated with licensed public water supplies	There are seven SPZ 1 and SPZ 2 areas associated with licensed public water supply locations: • one to the west of Pennington Flash; • one north of Lowton, south-west of Byrom Wood; • a further two licensed public water supply locations present south of Wash End with a further licensed public water supply location located to the south-east of Wash End; • one to the south of Kenyon; and • one to the south-west of Golborne. A further licensed public water supply location is present to the north-east of Croft, although no SPZ 1 or 2 is associated with this location. SPZ 3 covers most of the study area with the exception of the northern end.
Private licensed groundwater abstractions	Three within the study area, one at Leigh Golf Club, one at Haydock Park Golf Club and one at Birchwood Park, all associated with spray irrigation.
Registered unlicensed private groundwater abstractions	One at Phillips Farm, assumed for potable supply.

10.3.10 Further information on the groundwater in the Risley to Bamfurlong area is provided in Section 15, Water resources and flood risk.

Surface water

10.3.11 The route of the Proposed Scheme will cross a number of canal and main rivers, as described in Section 15, Water resources and flood risk. The main rivers and watercourses, including unnamed streams, tributaries, drains, ponds and culverts located within the study area are described in Volume 5: WR-005-0MA05.

10.3.12 There are no surface water designations or abstractions in the land quality study area of 250m from the land required for construction of the Proposed Scheme in the Risley to Bamfurlong area.

10.3.13 Further information on surface water in the Risley to Bamfurlong area is described in Section 15, Water resources and flood risk.

Current and historical land use

10.3.14 Current potentially contaminative land uses within the study area include 48 industrial and commercial sites.

10.3.15 Historical land uses identified within the study area with the potential to have caused contamination include seven landfill sites and 59 industrial and commercial sites. Infilled pits and ponds may have been filled with a variety of waste materials but have not been licensed.

10.3.16 Table 20 to Table 22 summarise the key current and historical contaminative land uses in the Risley to Bamfurlong area. These are categorised into:

- landfill sites;
- mining and mineral sites; and
- industrial, commercial and other sites identified with a high risk of potential contamination.

Table 20: Current and historical landfill sites located within the study area

Name and area reference	Location	Description
Warrington Road, Risley historical landfill, (MA05-03) and also Silver Lane Risley historical landfill (MA05-02) which is situated entirely within MA05-03	Located directly west of the restored Risley Landfill (MA05-05 – see below). The Warrington Road Landfill includes the area of the former Silver Lane historical landfill. The majority of the landfill is outside of the study area; the northern end of the landfill extends into the study area to the south-east of Bates Farm but not into the land required for construction of the Proposed Scheme.	Environment Agency records indicate both landfills accepted inert, industrial, commercial and special wastes including liquids and sludge. Waste was accepted at the Silver Lane historical landfill between 1975 and 1984 and at the Warrington Road Landfill between 1982 and 1992. Gas control measures are reportedly in place.
Restored Risley Landfill (MA05-05)	Situated directly north-west of the M62 junction 11. The northern and eastern areas of the landfill extend into the study area, with the eastern boundary of the landfill extending into the land required for construction of the Proposed Scheme.	Environment Agency records indicate that inert, industrial, commercial, household, special and liquid sludge waste was accepted at the landfill between 1994 and 2011 and was restored in 2015. The licence ref. EPR/BV7877IR has been revoked. There is ongoing gas and leachate collection.

Name and area reference	Location	Description
Historical Lily Lane landfill (MA05-106)	Located in the northern part of the study area, located both sides of the Leeds and Liverpool Canal. Abram Flashes SSSI extends onto the landfill from the south. Abram Flashes extends on to land required for construction of the Proposed Scheme.	Environment Agency records indicate that inert, industrial, commercial and household waste was accepted at the landfill between 31 December 1979 and 7 July 1983, when the licence was surrendered (EA reference EAHLD15526).
Historical landfill, land to the rear of 120 Lily Lane (MA05-111)	Situated north-west of Bamfurlong, the landfill extends into the northern part of the study area from the west, but not onto land required for the construction of the Proposed Scheme.	The Environment Agency does not hold information pertaining to the licensing of the landfill, the waste types accepted or operational dates.
Historical Lowton Sidings landfill (MA05-73)	Historical landfill located within land required for the construction of the Proposed Scheme, located east of Lowton.	The Environment Agency does not hold information pertaining to the licensing of the landfill, the waste types accepted or operational dates.
Historical Holcroft Hall Quarry Landfill (MA05-126)	Historical landfill located within the study area but outside of land required for the Proposed Scheme, east of Culcheth adjacent to the Glaze Brook.	The Environment Agency does not hold information pertaining to the licensing of the landfill, the waste types accepted or operational dates.

Table 21: Current and historical mining and mineral sites located within the study area

Name and area reference	Location	Description
Former Mains Colliery (extended pits) (MA05-104)	South of Bryn Gates, west of the land required for the construction of the Proposed Scheme, in the central – northern part of the study area. Directly south of Mains Colliery/mines (MA05-105 below).	The former Mains Colliery consisted of several shafts across the mines and had underground haulage which included underground compressed air engines, electric lighting, boilers and chimneys. Closure date is noted as 9 September 1960. The majority of the spoil heaps were located across MA05-104 with one shaft identified adjacent to the land required for the construction of the Proposed Scheme.
Former Mains Colliery/mines (MA05-105)	Directly north of Mains Colliery (extended pits) (MA05-104 above).	The former Mains Colliery consisted of several shafts across the mines and had underground haulage which included underground compressed air engines, electric lighting, boilers and chimneys. Closure date is noted as 9 September 1960. The majority of the mine buildings were located on MA05-105 with three shafts identified.

Name and area reference	Location	Description
Former Bamfurlong Colliery (MA05-108)	North of Bamfurlong in the north of the study area to the west of the land required for the construction of the Proposed Scheme, and directly south of the Leeds and Liverpool Canal.	Mapping indicates the former colliery included six shafts and had underground haulage which included underground compressed air engines, electric lighting, boilers and chimneys. Closure date is noted in 1936.
Mine shafts (MA05-122 and MA05-123)	To the west of Aye Bridge Farm, and approximately 150m north of Nan Holes Brook. Both shafts are situated in land required for construction of the Proposed Scheme.	Two historical mine shafts not clearly associated with a colliery. The Coal Authority has limited data, but shafts are listed as not treated.
Former Edge Green Colliery (MA05-99)	West of the land required for construction of the Proposed Scheme, approximately 550m north of Edge Green.	Historical colliery and associated infrastructure and shafts. Currently used as an aggregate storage area.

Table 22: Current and historical industrial, commercial and other sites identified with a high risk of potential contamination located within the study area

Name and area reference	Location	Description
Former Ministry of Defence (MoD) barracks (MA05-70)	On land required for the Proposed Scheme, adjacent to the west of Lowton Common.	Described as a MoD barracks site. Present from approximately 1947-1983. Potential for underground tanks and un-mapped areas used for potentially contaminative activities.
Former MoD barracks (MA05-31)	Located in the south-west of Culcheth outside of land required for the construction of the Proposed Scheme.	Present from approximately 1947 to 1963. Site is now occupied by residential properties.
Beech Mill (MA05-33)	Situated to the south-west of Culcheth, outside of land required for the construction of the Proposed Scheme.	Former cotton mill. Present from approximately 1893-1938. Site is now occupied by residential properties.
Former soap and glue works and current depot (MA05-46)	Located immediately adjacent to the east of land required for the construction of the Proposed Scheme to the east of Lowton Business Park.	Former animal processing site, from approximately 1893 to 1959. Redeveloped into a depot. Partially redeveloped but no known remediation strategy identified.
Current Taylor Business Park and former works (MA05-22)	Situated south of Culcheth, on land required for the construction of the Proposed Scheme.	Mixed commercial and industrial use. The site was a former works (type of works unknown) prior to redevelopment into a business park in approximately 1961.

10.3.17 Contaminants commonly associated with sites in Table 20, Table 21 and Table 22 could include metals, semi-metals, asbestos, organic and inorganic compounds. In addition, infilled pits and landfills could give rise to landfill gases such as methane or carbon dioxide and

leachate. Mining sites could also include acid mine waters with low pH values and mine gases such as methane, carbon dioxide, carbon monoxide and hydrogen sulphide.

Other regulatory data

10.3.18 The regulatory data reviewed included pollution incidents (major, significant and minor categories), radioactive and hazardous substances consents, ecological sites and environmental permits (previously landfill, integrated pollution control and integrated pollution prevention and control licences).

10.3.19 In the Risley to Bamfurlong area this includes:

- two significant incidents to controlled waters, within the study area. Both incidents were losses of waste related products, to Holcroft Moss. One occurred within land required for construction of the Proposed Scheme, one was outside land required for construction of the Proposed Scheme. None are located on land required for construction of the Proposed Scheme;
- seventeen discharge consents to surface water within the study area. Further details on the groundwater in the Risley to Bamfurlong area can be found in Section 15, Water resources and flood risk;
- three nationally significant ecological designations, as defined by the SMR, are located within the study area, including Holcroft Moss SSSI, which is a constituent part of the wider Manchester Mosses Special Area of Conservation (SAC);
- four Local Wildlife Sites (LWS), including three within, or partially within, the land required for the construction of the Proposed Scheme;
- seven Sites of Biological Importance (SBI), including one partially within land required for the construction of the Proposed Scheme; and
- one Local Nature Reserve (LNR), The Wigan Flashes, located directly west of land required for construction of the Proposed Scheme.

10.3.20 Further details of relevant regulatory data in the Risley to Bamfurlong area are provided in Section 5 of BID LQ-001-0MA05.

10.3.21 Further information on ecological designations in the Risley to Bamfurlong area is provided in Section 7, Ecology and biodiversity.

Mineral resources

10.3.22 There are a range of mining and mineral resources located within the study area that have the potential to be affected by the Proposed Scheme. These include sand, gravel, peat, clay, 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 OGA via the issue of Petroleum Exploration and Development Licences (PEDL).

Minerals plans

10.3.23 WBC is responsible for the regulation of minerals and waste in the southern half of the Proposed Scheme in this area (from the M62 to Culcheth). The WBC Local Plan Core Strategy was adopted in July 2014[78]. Policy MP9 sets out the policies that seek to encourage the efficient and sustainable use of mineral resources. These adopted policies enable the council to plan for a steady and adequate supply of aggregates. A 'Minerals Resource Study and Policy Review'[79] was undertaken by Urban Vision on behalf of WBC in March 2017. The aim was to review the existing Local Plan to ensure a steady and adequate supply of minerals to meet future demand in the area. This document is not part of the adopted WBC local plan and therefore its findings have not been considered as part of this assessment.

10.3.24 WMBC is responsible for the mineral and waste local plans for the northern half of the study area (from the north of Culcheth up to Bamfurlong). The Wigan Local Plan Core Strategy[80] was adopted in September 2013. Policy CP15 sets out the policies aimed at meeting the future need for minerals whilst minimising the adverse impacts to the environment, economy and quality of life. The Greater Manchester Joint Minerals Plan[81] also forms part of the Local Plan for Wigan Borough (as far as it applies). The Greater Manchester Joint Minerals Plan was adopted in April 2013 and outlines how the 10 boroughs within Greater Manchester can plan for minerals in a sustainable manner. No further revisions of either plan have been published.

10.3.25 The location of specific mineral and mining resources within the study area are described below.

Peat

10.3.26 Peat extraction is noted at the southern end of the study area, outside of the land required for the construction of the Proposed Scheme but there is no mineral safeguarding area (MSA) for these areas.

Clay deposits

10.3.27 The Proposed Scheme will pass through a brick clay MSA in the northern extent of the area around Bryn Gates and Bamfurlong, which is noted as coincident with the Pennine Middle Coal Measures.

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[78] Warrington Borough Council (2014), *Adopted Local Plan Core Strategy*. Available online at: https://www.warrington.gov.uk/sites/default/files/2020-09/Local_Plan_Core_Strategy_Feb_2015.pdf.

[79] Urban Vision on behalf of Warrington Borough Council (2017), *A Minerals Resource Study and Policy Review*'. Available online at: https://www.warrington.gov.uk/sites/default/files/2019-09/warrington_minerals_study_mar_2017_0.pdf.

[80] Wigan Metropolitan Borough Council (2013), *The Wigan Local Plan Core Strategy.* Available online at: https://www.wigan.gov.uk/Council/Strategies-Plans-and-Policies/Planning/Local-plan/CoreStrategy.aspx.

[81] Wigan Metropolitan Borough Council (2013), *The Greater Manchester Joint Minerals Plan*. Available online at: https://www.wigan.gov.uk/Council/Strategies-Plans-and-Policies/Planning/Local-plan/GM-Joint-Minerals-Development-Plan.aspx.

Coal

10.3.28 Coal is indicated to underlie the Proposed Scheme from the approximate location of the WCML railway to Bamfurlong. Worked coal seams are in excess of 90m deep up to 1km. A MSA for coal is present in the north of the study area, around Bryn Gates and Bamfurlong. Mining of iron pyrite is noted at the north of the study area associated with the Pennine Middle Coal Measures Formation. There are no known open cast coal mining sites within the study area.

10.3.29 Available records from the Coal Authority show that the route of the Proposed Scheme will pass through areas of recorded underground working from the approximate route of the Liverpool to Manchester (Chat Moss) Line to Bamfurlong. Coal Authority records indicate probable historical underground coal mining activities in the Bamfurlong area, between 90m and 1km below ground level (bgl). The former Edge Green, Main Green and Bamfurlong collieries are located in this area.

10.3.30 Available records show that two mine entries are located on land required for construction of the Proposed Scheme, west of Aye Bridge Farm. Both mine entries are directly under the route of the Proposed Scheme.

Petroleum Exploration and Development Licences/Hydrocarbons

10.3.31 The OGA indicates that the land required for the construction of the Proposed Scheme passes through four licensed areas: PEDL 193, PEDL 39, PEDL 262 and EXL 253. The EXL reference refers to an older form of licence in force prior to the introduction of PEDL in 1996. These licensed areas contain wells for mine gas (as recorded on the OGA interactive map viewer[82]). However, none of the wells are located in the study area. Therefore, the wells have been discounted from further assessment.

10.3.32 A Shale Prospective Area (SPA) is located throughout the study area.

Geoconservation resources

10.3.33 No geological SSSI or LGS sites have been identified within the study area. Therefore, no assessment of geoconservation resources has been undertaken.

Receptors

10.3.34 The sensitive receptors that have been identified within the study area are summarised in Table 23. A definition of receptor sensitivity is given in the SMR.

[82] Oil and Gas Authority (2019), *Onshore Interactive Maps*. Available online at: https://ogauthority.maps.arcgis.com/apps/webappviewer/index.html?id=29c31fa4b00248418e545d222e57ddaa.

Table 23: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents at existing properties, schools and study centres.	High
Land contamination	People	Employees and visitors of retail, business parks, farms and commercial properties (public and workplaces).	Moderate
Land contamination	People	Workers at and visitors of industrial properties.	Low
Land contamination	Groundwater	Principal aquifers - Helsby Sandstone Formation, Wilmslow Sandstone Formation, Chester Formation, Kinnerton Sandstone Formation, Collyhurst Sandstone Formation.	High
Land contamination	Groundwater	Secondary A aquifers - head, alluvium, glaciofluvial ice contact deposits, glaciofluvial sheet deposits, Pennine Middle Coal Measures Formation.	Moderate
Land contamination	Groundwater	Secondary (undifferentiated) aquifer - glacial till. Secondary B aquifers - Tarporley Siltstone Formation, Manchester Marls Formation.	Low
Land contamination	Surface waters	Small Brook, Glaze Brook, springs, and several unnamed streams and tributaries.	Low
Land contamination	Surface waters	Holcroft Lane Brook, tributary of Holcroft Lane Brook, Jibcroft Brook, Carr Brook, Nan Holes Brook, Hey Brook, tributaries of Hey Brook and Coffin Lane Brook, Windy Bank Brook and Leeds and Liverpool Canal.	Moderate
Land contamination	Surface waters	Ponds.	Low

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	Ecological designations	Holcroft Moss SSSI (part of Manchester Mosses SAC), Abram Flashes SSSI and Bryn Marsh and Ince Moss SSSI.	High
Land contamination	Ecological designations	LWS, LNR and SBI*.	Low
Land contamination	Built environment	Underground structures and buried services.	Low
Impacts on mining/ mineral and petroleum (gas) sites (severance and sterilisation).	Mineral sites	PEDL.	High
Impacts on mining/ mineral and petroleum (gas) sites (severance and sterilisation).	Mineral sites	Coal and brick clay MSA, SPA.	Moderate

** SBI and LWS are equivalent terms.*

Future baseline

Construction (2025)

10.3.35 Volume 5: Appendix CT-004-00000 provides details of the committed developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025.

10.3.36 No committed developments have been identified in this study area that will materially alter the baseline conditions in 2025 for land quality.

Operation (2038)

10.3.37 Volume 5: Appendix CT-004-00000 provides details of the committed developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038.

10.3.38 No committed developments have been identified in this study area that will materially alter the baseline conditions in 2038 for land quality.

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)[83]. The draft CoCP sets out the measures and standards of work that will be applied to the construction of the Proposed Scheme and

[83] Volume 5: Appendix CT-002-00000, Draft Code of Construction Practice.

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 will 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 (Sections 5, 11 and 16);
- the management of human exposure for both construction workers and people living and working nearby (Sections 5, 7, 11, 13 and 14);
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated) (Sections 6, 7, 11 and 15);
- management of any unexpected contamination found during construction (Sections 11 and 15);
- a post-remediation permit to work system (Section 11);
- storage requirements for hazardous substances such as oil (Sections 5, 11 and 16);
- traffic management to ensure that there is a network of designated site haul routes to reduce compaction/degradation of soils (Sections 5, 6 and 14);
- methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (Sections 5 and 16); and
- methods to manage discovery of unknown animal burial pits (Section 6).

10.4.3 The draft CoCP will require further detailed investigations, which may include both desk-based and site-based work, to confirm the full extent of areas of contamination. Such works will be required prior to and during construction. It also requires a risk assessment to be undertaken to determine what, if any, site specific remediation measures are required. The identified measures will allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants. The investigation and assessment of potentially contaminated sites will be undertaken in accordance with Environment Agency's Land Contamination Risk Management (LCRM) framework[84], based on CLR11[85] and British Standards BS10175[86] and BS8576[87]. In addition, a licence will need to be obtained from the Coal Authority for any works that disturb coal seams or mine workings.

[84] Environment Agency (2020), *Land Contamination Risk Management (LCRM)*. Available online at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm.

[85] Environment Agency (2004), *CLR11 Model Procedures for the Management of Land Contamination*. Available online at: http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/scho0804bibr-e-e.pdf.

[86] British Standards Institution (2011), *BS10175 Investigation of Potentially Contaminated Sites. Code of practice (+A2:2017)*, BSi.

[87] British Standards Institution (2013), *BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).*

10.4.4 A remedial options appraisal will be undertaken to define the most appropriate remediation techniques. Where appropriate, this appraisal will be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with the framework set out by the Sustainable Remediation Forum UK[88]. The preferred option will then be developed into a remediation strategy.

10.4.5 Contaminated soils excavated within the site, where reasonably practicable, will 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 will 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 will require earthworks, utility diversions, deep foundations, ground stabilisation and other activities, including the construction of the various viaducts, embankments and road infrastructure works. These aspects of the Proposed Scheme, along with other construction features, are shown on the CT-05 Map Series in the Volume 2, MA05 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 in relation to 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. All areas assessed are shown on Maps LQ-01- 312b to LQ-01- 314a (Volume 5, Land quality Map Book) and those considered as potentially posing a risk in relation to the Proposed Scheme are labelled with a reference number (Site ID). In this report the site ID are presented as MA05-05 and on the related map as 05-05.

10.4.8 In the Risley to Bamfurlong area, 54 sites remain following initial screening to go through to detailed risk assessment and require CSM. The majority of the sites that have undergone the more detailed risk assessments are historical or current landfills, industrial, mining and commercial sites.

10.4.9 CSM have been produced for those areas taken to detailed risk assessments. The following factors determine the need for detailed risk assessments:

[88] Sustainable Remediation Forum UK (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation.*

- whether the site is located within the land required for the construction of the Proposed Scheme;
- the vertical profile of the Proposed Scheme in the vicinity of the site;
- the presence of underlying sensitive groundwater aquifers (Principal or Secondary A) or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors.

10.4.10 Clusters of potentially contaminated sites of a similar nature have been grouped and assessed together, where appropriate.

10.4.11 A simple summary of the baseline CSM is provided in Table 24. A more detailed assessment of baseline risk is provided in Volume 5: Appendix LQ-001-0MA05. The 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. For clarity, 'on-site' means within the land required for the construction of the Proposed Scheme and 'off-site' refers to land beyond this boundary, but within the study area.

10.4.12 Not all sites referenced in Table 20 to Table 22 have been taken further in the assessment following the initial screening. Sites were not taken through to detailed assessment due to a predicted low risk resulting from the distance to the land required for the construction of the Proposed Scheme and the types of works to be undertaken in the vicinity of the site, for instance shallow utilities. Professional judgement or evidence of redevelopment have also been used.

Table 24: Summary of baseline CSM for sites which may pose a contaminative risk in relation to the Proposed Scheme

Category	Site group/ID	Human health risk	Groundwater risk	Surface water risk	Ecosystem risk	Buildings risk
On-site	Historical landfills MA05-05, MA05-73, MA05-106	Moderate/low to low	Moderate/low to very low	Low to moderate	Moderate/ low to very low	Moderate/ low
On-site	Former and current farms MA05-14, MA05-16, MA05-24 MA05-25, MA05-40, MA05-41, MA05-47, MA05-60	Moderate/low to low	Moderate/low to very low	Moderate/ low to very low	N/A	Low to very low

Category	Site group/ID	Human health risk	Groundwater risk	Surface water risk	Ecosystem risk	Buildings risk
On-site	Former and current railway land and rail goods yard/depots MA05-13, MA05-37, MA05-39, MA05-59, MA05-97, MA05-103, MA05-114	Moderate/low to low	Moderate/low to very low	Moderate/ low to very low	Moderate/ low to very low	Low to very low
On-site	Works MA05-54	Moderate/low to low	Moderate/low to very low	Very low	Very low	Low
On-site	Former MoD land MA05-70	Moderate/low to low	Moderate/low to very low	Very low	N/A	Low
On-site	Former sewage filter beds MA05-48	Moderate/low to low	Moderate/low to very low	Very low	N/A	Low to very low
On-site	Former tanks MA05-51, MA05-67	Moderate/low to low	Moderate/low to very low	Very low	N/A	Low to very low
On-site	Business park MA05-50	Moderate/low to low	Moderate/low to very low	Very low	N/A	Low to very low
On-site	Mine shafts MA05-122, MA05-123	Moderate to low	Moderate/low to low	Low	N/A	Moderate/ low to low
Off-site	Historical landfills MA05-03, MA05-111	Moderate/low	Moderate/low to very low	Very low	Moderate/low to very low	Moderate/ low
Off-site	Former and current railway land MA05-91, MA05-102, MA05-113, MA05-115, MA05-116, MA05-117	Moderate/low to low	Moderate/low to very low	Moderate/ low	Low	Low to very low
Off-site	Former collieries MA05-99, MA05-104, MA05-105, MA05-108	Moderate/low to low	Moderate/low to very low	Low	Low	Low
Off-site	Current and former works MA05-64, MA05-22	Moderate/low to low	Moderate/low to very low	Very low	Very Low	Low to very low
Off-site	Former animal processing site MA05-46	Moderate/low to low	Moderate to very low	Moderate/ low	N/A	Low to very low
Off-site	Former sewage filter beds MA05-49	Moderate/low to low	Moderate/low to very low	Moderate/ low to low	N/A	Low

Category	Site group/ID	Human health risk	Groundwater risk	Surface water risk	Ecosystem risk	Buildings risk
Off-site	Former scrap yard and current garage workshop MA05-63, MA05-66	Moderate/low to low	Moderate/low to very low	Very low	N/A	Very low to low
Off-site	Farms MA05-09, MA05-27, MA05-43, MA05-107	Moderate/low to low	Low to very low	Low	Low	Low
Off-site	Former and current tanks MA05-17, MA05-18, MA05-20, MA05-56, MA05-75	Moderate/low to low	Moderate/low to very low	Very low	N/A	Low
Off-site	Business park MA05-125	Moderate/low to low	Moderate/low to very low	Very low	N/A	Low to very low

N/A means receptor/pathway not present

Temporary effects

10.4.13 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.

10.4.14 Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be neutral even if the risk is deemed to be high. For example, this will be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is off-site, (i.e. outside the area required for construction).

10.4.15 A worsening risk at the construction stage compared to baseline will result in a negative effect, and conversely, an improvement will result in a positive effect. The assessment assumes that contamination will be controlled through the general measures in the draft CoCP. This will also include measures for mining related contamination, i.e. mine water and mine gas.

10.4.16 All of the sites set out in Table 24 have been assessed for the change in impact associated with the construction stage of the work and were found to have no significant effects.

10.4.17 In the event that unexpected contamination is encountered during the construction of the Proposed Scheme in this area, this will be remediated as described in the draft CoCP resulting in an overall beneficial effect.

10.4.18 The application of the measures set out in the draft CoCP makes it unlikely that there will be significant adverse effects, but it is considered that there may still be some temporary minor adverse effects during the construction period from ground disturbance in these areas.

These temporary minor adverse impacts at the construction stage are not regarded as significant in line with the methodology set out in the SMR.

10.4.19 There are several historical landfills (MA05-05, MA05-73 and MA05-106) within the land required for the construction of the Proposed Scheme all of which may require excavation into what is expected to be backfilled material. The nature of backfilled material and whether or not these landfills were lined is unknown, and there is the potential to generate material that may need treatment to render it suitable for re-use or disposal.

10.4.20 Construction compounds located in the study area could include the storage of potentially hazardous substances, such as fuels and lubricating oils, and may also be used for temporary storage of potentially contaminated soils. Control and mitigation measures are contained within the draft CoCP include measures to manage the risks associated with the storage of such materials resulting in no significant effects.

Permanent effects

10.4.21 In order to identify potential permanent effects, a screening assessment has been undertaken comparing the baseline and post-construction CSM to assess the permanent (post-construction) effects.

10.4.22 The magnitude of the permanent effects and their significance have been determined by assessing the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance is deemed to be neutral even if the risk is assessed to remain as high. This will be the case where the construction of the Proposed Scheme will not alter the risks from an existing potentially contaminated site that is outside the land required for the construction of the Proposed Scheme. As noted above, a worsening will result in negative effects and an improvement will result in positive effects.

10.4.23 There are no post-construction stage significant effects identified in the study area.

Mineral resources

10.4.24 Construction of the Proposed Scheme has the potential to affect existing mineral resources, and proposed areas of mineral exploitation. This could occur by sterilisation of the resource through direct excavation during construction of the Proposed Scheme or through temporary and/or permanent severance or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.

10.4.25 The northern extent of the study area, from Bryn Gates to Bamfurlong, lies within a brick clay and coal MSA.

10.4.26 Local authority data indicate that to north of the A580 East Lancashire Road shallow coal, between 50 -1200m deep, underlies the study area. The extreme northern end of the study area by Bamfurlong is underlain by workable surface coal resource taken to be less than 50m deep. Coal Authority data indicate the potential presence of shallow coal workings to

the north of the A58 Lily Lane, north of Bamfurlong, within land required for the construction of the Proposed Scheme, beneath existing operational railway (WCML). The locations of these workings partially coincide with the location of the former Bamfurlong colliery. Potential shallow coal workings are also indicated within land required for the construction of the Proposed Scheme, associated with highways improvements, to the north of Edge Green village.

10.4.27 The route of the Proposed Scheme passes through four OGA licensed areas, comprising three PEDL and one EXL. These contain wells for mine gas although none of the wells are located in the study area.

Temporary effects

10.4.28 The following section outlines the potential temporary effects arising during the construction of the Proposed Scheme.

10.4.29 Temporary adverse effects may occur where construction compounds are proposed within the MSA. In such cases, there will be a temporary sterilisation of the resource during construction works, but this is not considered to represent a significant effect and the resource will not be lost permanently.

Brick clay

10.4.30 Temporary adverse effects may occur where construction compounds are proposed within a MSA. In such cases, there will be a temporary sterilisation of the resource during construction works, but this is not considered to represent a significant effect and the resource will not be lost permanently.

10.4.31 Two satellite compounds (Bamfurlong satellite compound and Winstanley Road satellite compound) will lie within a MSA for brick clay in the Bamfurlong to Glazebrook area. The effect of construction of the Proposed Scheme on the identified brick clay deposits will be negligible.

Coal

10.4.32 Temporary adverse effects may occur where construction compounds are proposed within a MSA. In such cases, there will be a temporary sterilisation of the resource during construction works, but this is not considered to represent a significant effect and the resource will not be lost permanently.

10.4.33 Two satellite compounds (Bamfurlong satellite compound and Winstanley Road satellite compound) will lie within a MSA for coal in the Bamfurlong to Glazebrook area. The effect of construction of the Proposed Scheme on the identified coal deposits will be negligible.

Petroleum Exploration and Development Licences/Hydrocarbons

10.4.34 The effect of construction of the Proposed Scheme on the identified PEDLs and SPA will be negligible as it is unlikely that construction works will place a constraint on future exploitation of potential sources of shale gas or other forms of hydrocarbon resource.

Summary of temporary effects

10.4.35 Table 25 sets out a summary of the temporary effects identified for mineral resources.

Table 25: Summary of temporary effects for mineral resources

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
Brick clay MSA	MSA	MSA for brick clay associate with Pennine Middle Coal Measures	Medium	Moderate	Minor adverse effect (N)
Coal MSA	MSA	MSA for coal extraction	Medium	Moderate	Minor adverse effect (N)
PEDL 193, EXL 253, PEDL 262, PEDL 39	PEDL	Petroleum exploration and development licence areas	High	Negligible	Negligible (N)
Shale Gas	SPA	SPA for shale gas	Medium	Negligible	Negligible (N)

10.4.36 In general, there will be negligible to minor adverse temporary effects on the mineral resources, which are not significant.

Permanent effects

10.4.37 The following section outlines the potential permanent effects resulting from the construction of the Proposed Scheme.

Petroleum Exploration and Development Licences/Hydrocarbons

10.4.38 The effect of construction of the Proposed Scheme on the identified PEDLs will be negligible and not significant as the footprint is considered to be too small to enable a more significant impact on the PEDLs. It is unlikely that construction of the Proposed Scheme will 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 SPA, and the limited area of land required for the permanent works that will restrict potential well locations.

Other mineral resources

10.4.39 The effect of construction of the Proposed Scheme on the identified brick clay and coal deposits will be permanent where underlying the footprint of the permanent works, with a

strip of mineral becoming sterilised. However, the effect on the MSA is considered to be minor adverse, and therefore, not significant, due to the effects being contained to a small proportion of the total MSA. Mitigation measures (if any) will be discussed in advance of the works with the Mineral Planning Authority, WBC, WMBC and the mineral owner.

Summary of permanent effects

10.4.40 Table 26 sets out a summary of the permanent effects identified for mineral resources.

Table 26: Summary of permanent (post-construction) effects for mineral resources

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
Brick clay MSA	MSA	MSA for brick clay associated with Pennine Middle Coal Measures	Medium	Moderate	Minor adverse effect (N)
Coal MSA	MSA	MSA for coal extraction	Medium	Moderate	Minor adverse effect (N)
PEDL 193, EXL 253 PEDL 262, PEDL 39	PEDL	Petroleum exploration and development licence areas	High	Negligible	Negligible (N)
Shale Gas	SPA	SPA for shale gas	Medium	Negligible	Negligible (N)

10.4.41 There will be negligible to minor adverse effects on the mineral resources located in the study area, which are not significant.

Geoconservation sites

10.4.42 No geoconservation areas such as SSSI or LGS are present in the study area.

Other mitigation measures

10.4.43 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 will be developed at the detailed design stage if required. These measures will ensure that risks to people, property and environmental receptors from contaminants in the ground will be controlled such that they will not be significant. For example, measures might include excavation and treatment of contaminated soils or controls to manage movement of ground gas and leachate.

10.4.44 Mitigation of the effects on mineral resources could include extraction of the resource within the land required for the construction of the Proposed Scheme adjacent to, rather than beneath the structural footprint of the Proposed Scheme. A plan will be discussed in advance of the construction works with the landowner, the mineral planning department at

WBC, WMBC and any other relevant parties to assist in achieving an effective management of minerals within the affected locations.

Summary of likely residual significant effects

10.4.45 Based on the information available and with the application of the mitigation measures detailed above, no likely significant adverse residual effects are anticipated with respect to land quality.

10.4.46 Where remediation at contaminated land sites is undertaken there may be significant beneficial residual effects.

Cumulative effects

10.4.47 Volume 5: Appendix CT-004-00000 sets out the committed developments that have been considered in the assessment of cumulative effects.

10.4.48 Based upon the review of committed development sites, it is assessed that there will be no significant cumulative effects arising from the construction of the Proposed Scheme with respect to land quality.

10.5 Effects arising from operation

10.5.1 Users of the Proposed Scheme (i.e. rail passengers) will be 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 will be in accordance with environmental legislation and good practice. Spillage and pollution response procedures similar to those to be outlined in the draft CoCP will be established for all high-risk activities and employees will be trained in responding to such incidents.

Assessment of impacts and effects

10.5.3 The Proposed Scheme within this area will include the B5207 Wilton Lane auto-transformer station. Auto transformer stations and substations can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, in common with other modern infrastructure development, secondary containment appropriate to the level of risk will 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. Long-term gas and groundwater control measures may be required to address mine gas and mine water contamination, arising as result of stabilisation of the Proposed Scheme.

Summary of likely residual significant effects

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

Cumulative effects

10.5.7 There are anticipated to be no significant cumulative residual effects from construction or operation of the Proposed Scheme.

Monitoring

10.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme. Requirements for monitoring will be determined as part of the investigation, treatment and validation of contamination on a site-specific basis as part of the detailed design process. During the operational phase, monitoring works for groundwater and landfill or mine gas will continue, where required and in consultation with the Coal Authority and Environment Agency. 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 within the Risley to Bamfurlong area. It summarises the baseline conditions found within and around the route of the Proposed Scheme and describes the likely impacts and significant effects during construction and operation on landscape and visual receptors.

11.1.2 The operational assessment section refers not just to the running of the trains, vehicles on roads and any associated lighting but also the presence of the new permanent infrastructure associated with the Proposed Scheme.

11.1.3 Engagement with Warrington Borough Council (WBC) and Wigan Metropolitan Borough Council (WMBC) has been undertaken. The purpose of this engagement has been to discuss the assessment methodology, the extent of the landscape and visual study area, the extent of the landscape character boundaries and the locations of visual assessment and verifiable photomontage viewpoints.

11.1.4 Further details on the landscape and visual assessment, including engagement, baseline information and assessment findings, are presented in the Volume 5, Landscape and Visual Map Book and Volume 5: Appendix LV-001-0MA05, which comprises the following:

- Part 1: Engagement with technical stakeholders;
- Part 2: Landscape character assessment;
- Part 3: Visual assessment;
- Part 4: Assessment matrices; and
- Part 5: References.

11.1.5 The Proposed Scheme is described in Section 2. The Volume 2, MA05 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 will be significantly affected at the construction (Map Series LV-03) and operation (Map Series LV-04) phases and landscape character areas (LCA) that will be significantly affected at the construction and operation phases (Map Series LV-02).

11.1.6 A separate, but related, assessment of effects on the setting of heritage assets is reported in Section 9, Historic environment.

11.2 Scope, assumptions and limitations

11.2.1 The scope, key assumptions and limitations for the landscape and visual assessment are set out in full in Volume 1 (Section 8) and the EIA Scope and Methodology Report (SMR)[89].

11.2.2 Surveys were undertaken during the following periods to inform the landscape and visual assessment:

- summer surveys from July to August in 2017, August to September in 2018, May 2019 and September 2020; and
- winter surveys in February and March 2018, March 2019, November 2019 and November 2020.

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 means that the actual extent of visibility will be substantially less than that shown in the ZTV, and professional judgement has been 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. However, overhead line equipment as well as tall construction plant are taken into account in the assessment of effects on LCA and visual receptors.

11.2.5 Landscape and visual receptors within approximately 1.5km of the centre line of the route of the Proposed Scheme have been assessed as part of the study area. Where important receptors fall just beyond the ZTV, professional judgement has been used in recording and assessing these. Long distance views of up to 3km have been considered at settlement edges, such as at Ashton-in-Makerfield, Leigh and Irlam.

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. 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 and year 30. The assessment of landscape effects is undertaken for the construction phase and for the operational phase at year 1, year 15 and year 30. The landscape assessment does not consider seasonal variations e.g. winter/summer, since these do not affect character.

[89] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

11.2.7 Professional judgements on landscape value are provided in the baseline descriptions and judgements on susceptibility of the landscape to the Proposed Scheme and overall landscape sensitivity are provided as part of the assessment of effects on each significantly affected LCA.

11.2.8 The assessment has been carried out on the basis that design of structures will, insofar as reasonably practicable, integrate with existing skyline features and will make use of a simple, clean and coherent palette of materials to help structures fit in the landscape.

11.2.9 It has been assumed that all vegetation within the land required for construction of the Proposed Scheme will be removed during construction unless stated otherwise. This excludes areas included only for the purpose of mitigation planting. Removed vegetation will be reinstated insofar as is reasonably practicable and would provide screening and integration benefits by year 15.

11.2.10 It has also been assumed that with respect to utilities and utility decommissioning, it is likely that the majority of existing vegetation can be retained. Vegetation will be removed along new utility lines, based on easement guidance from specific utility companies. All vegetation removed during utilities construction work will be reinstated insofar as is reasonably practicable. The assessment has been based on the assumption that any reinstatement planting will provide integration benefits by year 15. Works associated with underground utilities within highways will follow the principles set out in the draft Code of Construction Practice (CoCP)[90] and existing street trees and property boundary vegetation will be retained insofar as is reasonably practicable.

11.3 Environmental baseline

Existing baseline

Landscape baseline

11.3.1 The study area extends from Risley, Glazebrook and Warrington in the south, to Abram, Wigan and Bamfurlong in the north.

11.3.2 The low-lying, undulating farmland and peatland of the Mersey Valley to the south includes Chat Moss and Holcroft Moss. The latter is designated as a Site of Special Scientific Interest (SSSI) and is part of the Manchester Mosses Special Area of Conservation (SAC), as is the adjacent Risley Moss, which is also a Local Nature Reserve (LNR). The area to the north is characterised by the presence of flashes - predominantly low-lying wetland areas formed by subsidence resulting from historic mining and extraction operations. Examples include Pennington Flash, Wigan Flashes and Abram Flashes SSSI and areas used as landfill sites including the restored Risley Landfill at Silver Lane.

[90] Volume 5: Appendix CT-002-00000, Draft Code of Construction Practice.

11.3.3 To the south, the landscape is characterised by former mosslands the result of past peat extraction. The landscape has a predominantly flat topography with localised variations resulting from man-made features such as former railway lines and landfill sites. In the north, land rises gently either side of Hey Brook, with localised steeper topography associated with watercourses and historic mining activity. It is a fragmented landscape formed of a mosaic of farmland, scattered urban settlements, industry and derelict or reclaimed mine workings. The identity of the area is strongly associated with past industrial activity. Although historically a degraded landscape adversely affected by mining, restoration has created attractive landscapes and habitats which form part of the Greenheart Regional Park. Promoted routes for walkers, cyclists and horse riders now link a series of Greenheart sites that provide opportunities for people to enjoy the natural environment. These include Bickershaw Country Park, Pennington Flash Country Park and LNR, Three Sisters Recreation Area and LNR, the Leeds and Liverpool Canal, Lightshaw Meadows, Viridor Wood and Byrom Wood.

11.3.4 The urban areas of Warrington, Golborne, Leigh and Wigan enclose tracts of agricultural land used for arable farming and grazing. Areas of reclaimed land include community woodland and other areas of open public access land such as Bickershaw Country Park, Aspull Common, Byrom Wood and Viridor Wood.

11.3.5 The settlement pattern has been shaped by past mining and industry, resulting in piecemeal development of housing and industrial uses. There are conservation areas in parts of Leigh, Culcheth and Golborne. The M62, the A580 East Lancashire Road, West Coast Main Line (WCML) and Liverpool to Manchester Line (Chat Moss) are intrusive elements in the landscape, cutting across the existing landform, causing severance of the landscape pattern and connectivity across the landscape. These transport routes also contribute to low tranquillity. Permissive footpaths along dismantled railway lines around Golborne and Culcheth enhance connectivity between long distance footpaths such as along the Leeds and Liverpool Canal and other public rights of way (PRoW). A length of the dismantled railway line around Culcheth forms Culcheth Linear Park.

11.3.6 The LCA have been determined as part of an integrated process of environmental characterisation, informed by a review of historic mapping, historic landscape characterisation datasets and the outcome from other topics including ecological assessments. Use has been made of published landscape character assessments and a wide range of supporting GIS data, aerial photography and Ordnance Survey mapping, plus desk study and fieldwork. Landscape character assessments reviewed include the relevant

National Landscape Character Areas[91] and the landscape character assessments for WBC[92], Salford City Council[93], Trafford Metropolitan Borough Council[94] and WMBC[95].

11.3.7 These published LCA have been adapted for this assessment to provide LCA of an appropriate, consistent scale. Minor amendments have been made to some published LCA boundaries to reflect existing conditions, as verified on-site, or to draw out specific aspects susceptible to change from the Proposed Scheme.

11.3.8 For the purposes of this assessment, the study area for the Risley to Bamfurlong area has been subdivided into 13 LCA. Full descriptions of these LCA are provided in Volume 5: Appendix LV-001-0MA05.

11.3.9 Twelve of the 13 LCA will not be significantly affected by the Proposed Scheme due to their distance from the Proposed Scheme and the presence of intervening built elements and vegetation which will contain the effects of the Proposed Scheme. In addition, these 12 LCA will not be significantly affected on account of their landscape value and ability to accommodate this type of change.

11.3.10 A summary of the remaining LCA that will be significantly affected within the Risley to Bamfurlong area is shown in Figure 9 and described below.

[91] 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.

[92] Warrington Borough Council (2007), *Landscape Character Assessment*. Available online at: https://www.warrington.gov.uk/sites/default/files/2019-08/landscape_character_assessment_2007.pdf.

[93] Salford City Council (2017), *Landscape Character Assessment*. Available online at: https://www.salford.gov.uk/media/385604/lca-final-document.pdf.

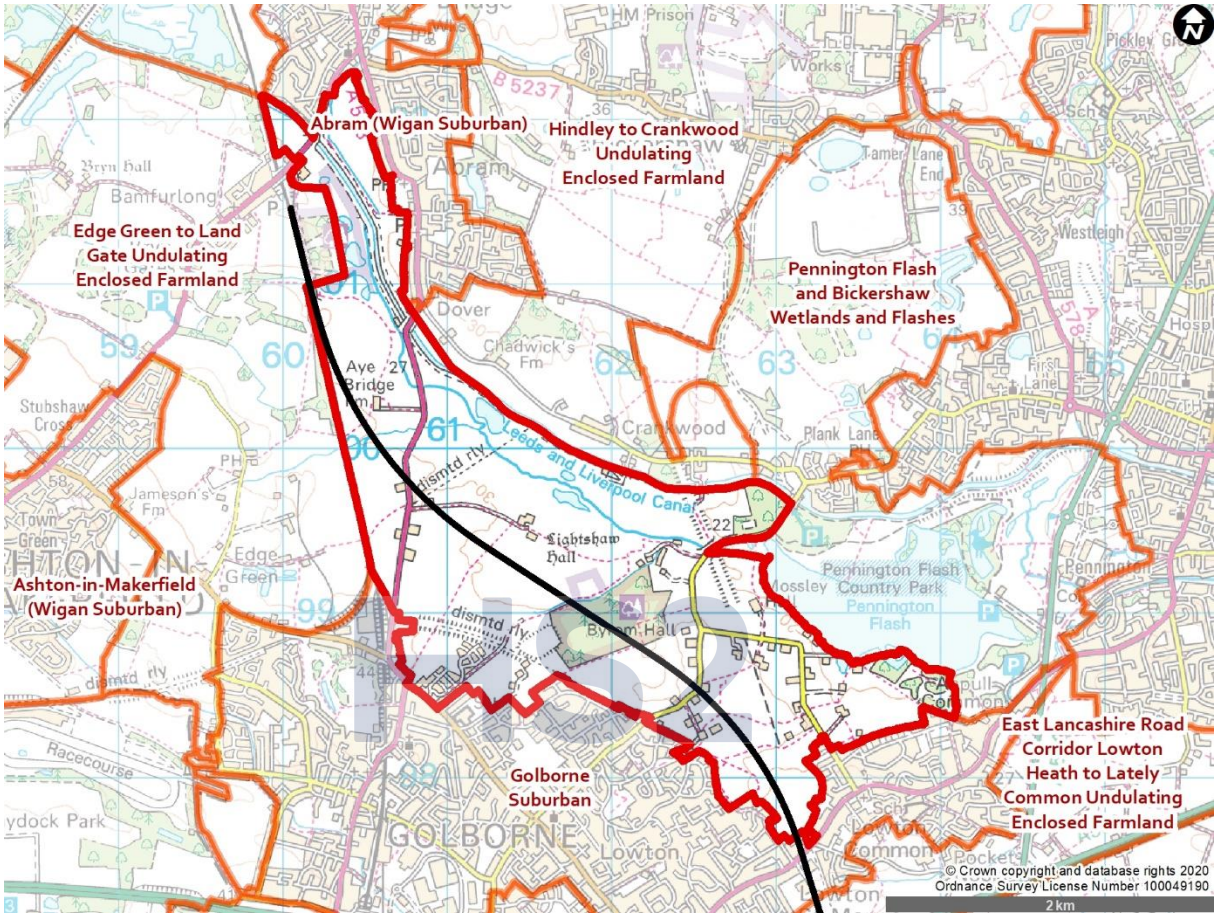
[94] Trafford Metropolitan Borough Council (2004), *Supplementary Planning Guidance,* Landscape Strategy. Available online at: https://www.trafford.gov.uk/planning/strategic-planning/docs/spg-2004-landscape-strategy.pdf.

[95] Wigan Metropolitan Borough Council (2009), *Wigan: A landscape character assessment.* Available online at: https://www.wigan.gov.uk/Docs/PDF/Resident/Planning-and-Building-Control/LandscapeCharacterAssessment.pdf.

Significantly affected landscape character areas

Hey Brook to Aspull Common Farmland and Flashes

Figure 9: Hey Brook to Aspull Common Farmland and Flashes



11.3.11 Hey Brook to Aspull Common Farmland and Flashes LCA is a low-lying area within the Makerfield Basin. Although essentially rural in character, it is set within the context of the surrounding urban areas of Abram to the north and Golborne to the south, as shown in Figure 9.

11.3.12 The low-lying landscape contains numerous hydrological features including the Hey Brook, Leeds and Liverpool Canal and Nan Holes Brook, along with ponds, field drains and the Abram Flashes SSSI. Small to medium scale, irregularly shaped fields with remnant hedgerows along field boundaries support arable farming. Rough grassland and permanent pasture cover the Hey Brook floodplain. As land rises towards Golborne in the south-west, arable fields are larger in scale with well-maintained field boundary hedgerows.

11.3.13 Historic transport links including the Leeds and Liverpool Canal and three dismantled railway lines, listed buildings and structures such as Lightshaw Hall (Grade II*) and Byrom Hall (Grade II), farms and sunken ways, add to the landscape heritage value of this LCA.

11.3.14 This is a regenerating landscape supporting a range of interlinked semi-natural habitats with developing tree and scrub cover and is an important link in the green infrastructure network

for Greater Manchester and Wigan Greenheart Regional Park. The area supports a rich variety of vegetation and habitat types including woodland, mature field boundary oak trees, hedgerows, meadows and flashes. There is open access woodland at Viridor Wood, Aspull Common, Pennington Flash and in association with former halls and parkland estates for example Byrom Wood. Woodland at Viridor Wood and to the east of the WCML form a strong boundary to the north and west borders of this LCA. This LCA is sparsely populated with scattered farmhouses. An extensive PRoW network creates the opportunity for access to green space in proximity to these urban areas and contributes to the overall value of the landscape.

11.3.15 Detracting elements include the busy A573 Wigan Road and the WCML on embankment. These together with the presence of enclosing settlements and often abrupt interfaces between rural and urban areas, reduce the overall sense of tranquillity.

11.3.16 The overall value of Hey Brook to Aspull Common Farmland and Flashes LCA is **medium** based on the extensive PRoW network, contribution to the green infrastructure network and presence of infrastructure.

Visual baseline

11.3.17 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the viewpoint location maps (see Volume 2, MA05 Map Book, Map Series LV-03 and LV04). 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 study area), 2: Residential, 3: Recreational[96], 4: Transport, 5: Hotels/healthcare/schools and 6: Employment.

11.3.18 Views for residents within larger settlements such as Golborne, are generally filtered through intervening built form with views from settlement edges typically filtered by intervening hedgerows and vegetation. Views from individual properties including scattered farmhouses are often partially filtered through intervening garden vegetation. There are open views due to the low-lying landform of the peatland and mosses, and the lack of mature vegetation. However, views are often limited by the physical presence of infrastructure elements and built form at the edge of urban settlements. From within the low-lying Hey Brook to the north of the area, views are limited by linear woodland belts, waterside vegetation, the gently undulating landform and built form.

11.3.19 A number of locations along Leeds and Liverpool Canal provide elevated, filtered views over the Hey Brook corridor for footpath and canal users. Glazebrook Timberland Trail long distance footpath crosses to the east of the area. Views for users of the trail are largely contained by the localised valley landform and vegetation. Woodland along the dismantled railway lines close to Golborne, Lowton and Culcheth limits views for users of these permissive routes. Long distance views are possible from the higher ground to the north of

[96] 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.

Pennington Flash Country Park, to the south from Pestfurlong Hill at Gorse Covert, Risley and Three Sisters LNR.

11.3.20 Hedgerows are characteristic of the farmed landscape. To the north of the area, views for footpath users and road users are often contained by well-maintained hedgerows and woodland. To the south of the area where hedgerows are largely absent or intermittent and there is less woodland cover, more expansive views across the landscape are possible.

11.3.21 The views from main road, including the M62, are generally restricted by local landform and mature roadside vegetation. Roadside vegetation along the A580 East Lancashire Road is intermittent and consequently road users often have wide views over agricultural land towards the urban edges of Golborne and Culcheth.

11.3.22 There are no protected views within the study area.

Future baseline

Construction (2025)

11.3.23 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. The following committed developments of relevance to landscape and visual during construction in this area are set out in Table 27.

Table 27: Committed developments relevant to landscape and visual during construction

Map book reference[97]	Planning reference	Description	How this is considered in the assessment
MA05/088	A/18/86062/RMMAJ	Location: The Bungalow and Scrap Yard to Rear Pocket Nook Lane, Lowton, Warrington, WA3 1AE. Application for the erection of 49 dwellings consisting of 12. 1-bedroom flats, 12. 2-bedroom houses, and 25. 3-bedroom houses, following demolition of bungalow. Reserved Matters to A/17/84401/OUTMAJ, seeking approval of appearance, landscaping, layout and scale.	Informing future baseline.
MA05/089	A/17/84401/OUTMAJ	Location: The Bungalow and Scrap Yard, Pocket Nook Lane, Lowton, Warrington, WA3 1AE. Outline Planning Application for demolition of existing buildings and construction of 100% Market Housing in accordance with the previous Planning Permission (A/10/74938), accessed from Pocket Nook Lane together with all Associated Works.	Informing future baseline.

[97] Volume 5, Planning Data/Committed Development Map Book: Maps CT-13-314b to CT-13-318.

Map book reference[97]	Planning reference	Description	How this is considered in the assessment
MA05/353	A/18/86157/MAJOR	Location: Oaklands, 196 And 196A Newton Road, Lowton, Warrington WA3 2AQ. Residential development of 28 dwelling houses comprising of six two-storey detached dwellings, 16 two-storey semi-detached dwellings and six two and a half-storey dwellings with parking and landscaping following demolition of existing building.	Informing future baseline.

11.3.24 The following committed developments have been included as part of the future baseline and considered within this assessment:

- committed development MA05/088 will introduce new housing in an urban area, which is adjacent to the land required for construction of the Proposed Scheme, altering the future baseline the Proposed Scheme is assessed against;
- committed development MA05/089 will introduce new housing in an urban area, which is adjacent to the land required for construction of the Proposed Scheme, altering the future baseline the Proposed Scheme is assessed against; and
- committed development MA05/353 will introduce new housing in a currently wooded area within the urban setting, which is adjacent to the land required for construction of the Proposed Scheme, reducing woodland cover currently present and altering the future baseline the Proposed Scheme is assessed against.

Operation (2038)

11.3.25 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No committed developments of relevance for landscape and visual have been identified that would materially alter the future baseline in this area.

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 will be visible from many locations and will have the potential to give rise to significant temporary effects that cannot practicably be mitigated. Such effects will 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 will 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. Effects

during other stages of works are likely to be less intensive due to less construction equipment being required at the time and a reduced intensity of construction activity.

11.4.3 Section 2.2 sets out the key permanent features of the Proposed Scheme and Section 2.3 describes the construction compounds and associated temporary works that have been considered in this assessment.

Avoidance and mitigation measures

11.4.4 Measures that have been incorporated into Sections 12 and 14 of the draft CoCP to avoid or reduce landscape and visual effects, where reasonably practicable, during construction include the following:

- avoidance of unnecessary tree and vegetation removal, and protection of existing trees in accordance with BS 5837: Trees in relation to design, demolition and construction[98];
- use of well-maintained hoardings and fencing;
- prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles;
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses; and
- replacement of any trees intended to be retained should they 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 will relate to the presence of construction plant, compounds and soils and material storage and stockpiling. Key construction activities that will give rise to the most apparent changes to landscape and visual receptors are: the excavation of cuttings, construction of viaducts and embankments, the removal of existing vegetation including trees and hedgerows and the closure and diversion of existing public highways and PRoW. Other key changes include the construction of overbridges, underbridges and auto-transformer stations, the diversion of overhead power lines and the demolition of buildings and structures.

11.4.7 Non-significant effects are reported in Volume 5: Appendix LV-001-0MA05.

[98] British Standards Institution (2012), *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*.

Landscape assessment

11.4.8 The LCA set out in Table 28 will be significantly affected during construction of the Proposed Scheme.

Table 28: Summary description and assessment of effects on LCA

Location	
Hey Brook to Aspull Common Farmlands and Flashes The low-lying Hey Brook to Aspull Common Farmlands LCA, of **medium** value, will be directly impacted by large-scale construction works occurring across a large proportion of this LCA. Large-scale earthworks will be introduced into this LCA in association with the construction of Lowton cutting, Slag Lane viaduct, Lowton South embankment and Lowton North embankment, A573 Wigan Road realignment and viaducts and WCML box structure. The Proposed Scheme will run through the length of the LCA bisecting Hesketh Meadows Playing Fields, Lowton Common and Byrom Wood. Hesketh Meadow Playing fields will be relocated. Access to Byrom Wood will be maintained through the temporary realignment of Footpath Golborne 33/10 and Footpath Golborne 31/10. Slag Lane satellite compound, A573 Wigan Road satellite compound and Bamfurlong satellite compound will be uncharacteristic elements introduced into the landscape and their presence will affect the landscape setting of listed assets and the landscape context of Abram Flashes SSSI. Lighting for satellite compounds and lighting to facilitate construction of WCML connections will create new areas of illumination in this largely unlit landscape. Field patterns will be altered due to severance by the Proposed Scheme and the removal of field boundary vegetation including mature field oaks to the west of Red House Farm and woodland within Byrom Wood. Construction activity in relation to utilities work will result in further loss of woodland within Byrom Wood. Due to the medium scenic value, recreational opportunities within the LCA, diverse landcover value and presence of existing rail infrastructure, the landscape has a **medium** susceptibility to change arising from the Proposed Scheme. Severance of the landscape including PRoW and the introduction of construction works will result in a **high** magnitude of change to the landscape. The **high** magnitude of change for Hey Brook to Aspull Common Farmlands and Flashes and its **medium** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

Visual assessment

Introduction

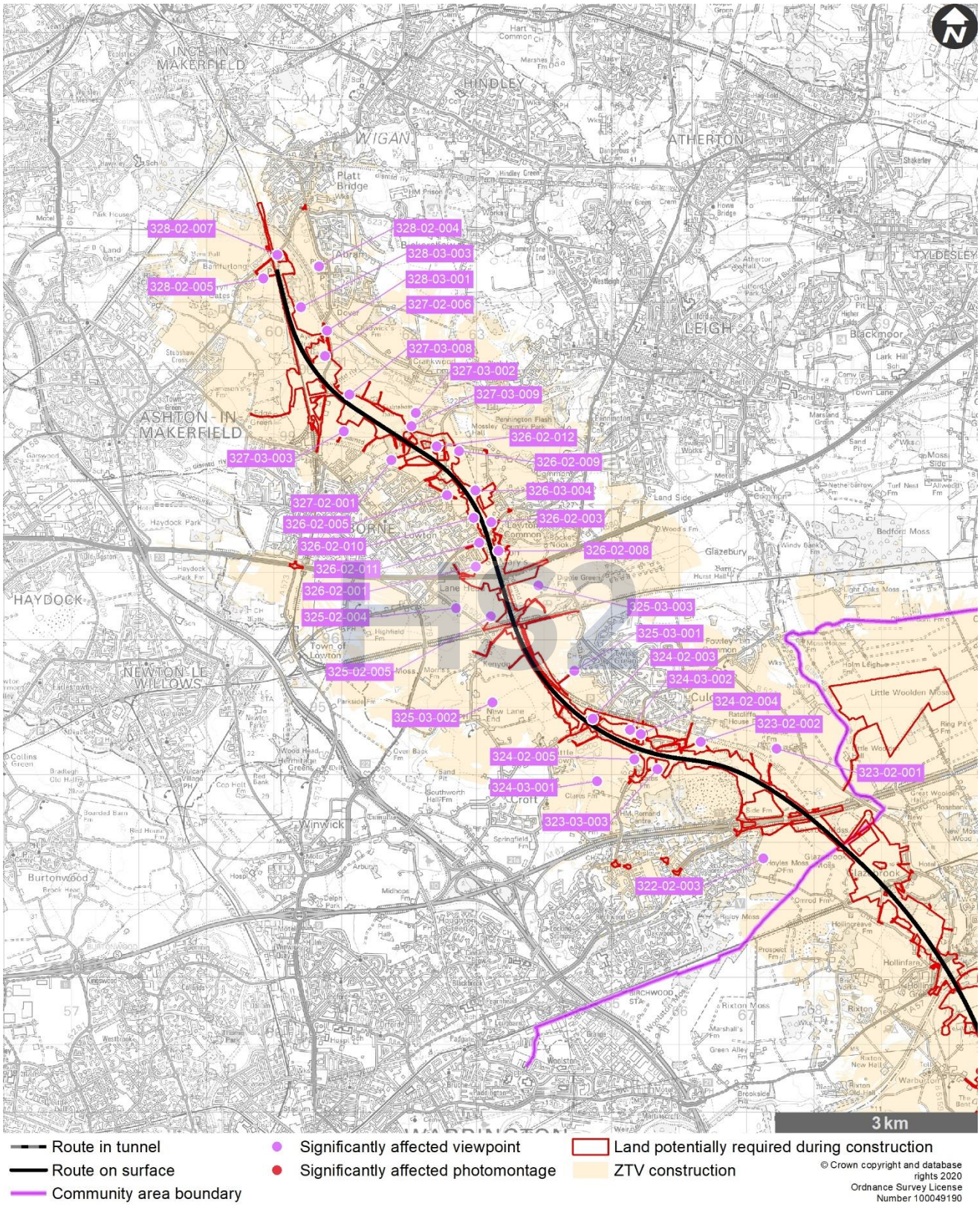
11.4.9 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, will be in leaf. Where visual receptors are predicted to experience significant effects at night-time arising from additional lighting, these are also presented in this section.

11.4.10 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptor. Effects on other receptor types with lower sensitivity will be lower than those reported.

11.4.11 The visual assessment has identified locations where continuous night working and/or overnight working during construction will result in significant effects on visual receptors (summarised in Table 29 and described in detail in Volume 5: Appendix LV-001-0MA05).

11.4.12 Table 29 describes the construction phase potentially significant visual effects. Viewpoint locations are shown in Map Series LV-03 in the Volume 2, MA05 Map Book.

Table 29: Construction phase significant visual effects



View north-east from Footpath Birchwood 25 (High sensitivity receptors) (VP 322-02-003)	
Residents of Omrod Farm, Milverton Farm, New Hall Farm, Railway cottages, Hoyle's Moss Farm and Gorse Covert and users of Footpath Birchwood 25 of **high** susceptibility, and workers at businesses along the A574 Birchwood Avenue, Daten Avenue and the A574 Birchwood Way of lower susceptibility all with **medium** value views, will experience a noticeable change to middle-distance views due to the presence of large-scale construction works including the construction of Glazebrook North embankment (in the adjacent Broomedge to Glazebrook area (MA04)), M62 West viaduct and M62 realignment. Construction work will be visible across much of the view. M62 West viaduct south satellite compound, earthworks, temporary stockpiling of materials and construction vehicles, will be introduced into views of the otherwise agricultural landscape and will partially obscure views of Rivington Pike in the far distance. Clearance of woodland from M62 embankments will open up views of traffic movements and lighting along the M62. Views from farms to construction works will generally be oblique or screened by intervening farm buildings. For residents of Gorse Covert, views will be partially filtered through intervening garden vegetation. Users of Footpath Birchwood 25 will have sequential views of construction works. Residents and workers at businesses along the A574 Birchwood Park Avenue, Daten Avenue and the A574 Birchwood Way will experience views of road widening, and construction traffic but these views will be in the context of the existing road corridor. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View east from Footpath Croft 20 (High sensitivity receptor) (VP 324-03-001)	
Footpath users and residents of Clares Farm and properties along the A574 Warrington Road of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views due to the presence of large-scale construction works including the construction of Culcheth cutting, A574 Warrington Road realignment and overbridge and Glaziers Lane realignment. Construction activity will be visible across much of the view although some views will be partially filtered through intervening vegetation. Construction plant, earthworks, temporary material stockpiles and fencing will be new, large-scale elements introduced into views of a largely rural landscape. However, these views will be in the context of HMP Risley, the restored Risley Landfill site and the A574 Warrington Road. Construction traffic using the A574 Warrington Road and Glaziers Lane will introduce additional traffic movement into views. Views for users of Footpath Croft 20 will be sequential and partially filtered through intervening vegetation. Views for residents of Clares Farm will be filtered through intervening vegetation. Views for residents along the A574 Warrington Road will be largely oblique and screened by intervening buildings or filtered through intervening garden vegetation. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and h**igh** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View north-east from Footpath Croft 14a (Medium sensitivity receptors) (VP 323-03-003)	
Footpath users of **high** susceptibility and with **medium-low** value views, will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Culcheth cutting, A574 Warrington Road realignment and overbridge. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be introduced into views of the arable landscape and urban edge of Culcheth	Level of effect: **Moderate** adverse (significant)

View north-east from Footpath Croft 14a (Medium sensitivity receptors) (VP 323-03-003)	
and will be visible across a large proportion of the view. However, views of construction activity will be perceived in the context of existing built development at Taylor Business Park. Vehicles using the A574 Warrington Road as a construction traffic route will introduce additional vehicle movements into views. Users of Footpath Croft 14a will experience sequential and at times near-distance views of construction works. Removal of vegetation will noticeably change the composition of views and will open up views of construction activity and the emerging structures in the middle distance. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **medium** sensitivity will result in a **moderate** adverse significant effect.	

View east along the existing A574 Warrington Road (High sensitivity receptors) (VP 324-02-005)	
Residents along the existing A574 Warrington Road of **high** susceptibility and with medium value views, will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Culcheth cutting, A574 Warrington Road realignment and overbridge. Construction activity will be visible across a large proportion of the view. However, some views will be partially filtered through intervening vegetation or screened by intervening buildings. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be new and uncharacteristic elements introduced into views of the A574 Warrington Road and mature vegetation. The removal of mature woodland from the grounds of Newchurch Old Refectory (also known as Newchurch Old Rectory) and Taylor Business Park, will open up views of the A574 Warrington Road, Taylor Business Park, construction activity and the emerging structures. Construction traffic using the A574 Warrington Road will introduce additional traffic movement into views. Residents along the east side of the A574 Warrington Road, will also have views of construction activity from the rear of their properties. However, these views will be partially filtered through intervening garden vegetation and seen in the context of the restored Risley Landfill site. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and high sensitivity will result in a major adverse significant effect.	Level of effect: Major adverse (significant)

View south from Footpath Culcheth and Glazebury 148 (High sensitivity receptors) (VP 323-02-001)	
Residents of Franks Farm, Brookside, Sunnymead, Hanging Birch Farm and surrounding properties and footpath users of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle and far-distance views due to the presence of large-scale construction works including the construction of M62 West viaduct, Culcheth South embankment, Risley East accommodation underbridge and Footpath Croft 13 accommodation underbridge. Construction activity will be visible across a moderate proportion of the view. M62 West viaduct north satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be introduced into views of the arable landscape. For residents at this location, views will be partially screened by the landform of the dismantled railway line and filtered through intervening garden vegetation. Users of Footpath Culcheth and Glazebury 148 will have sequential and largely oblique views of the construction works partially filtered through intervening vegetation and landform. However, vegetation will be removed within the area required for construction, which will	Level of effect: **Moderate** adverse (significant)

View south from Footpath Culcheth and Glazebury 148 (High sensitivity receptors) (VP 323-02-001)	
noticeably change the composition of views. There will also be views of construction activity in relation to utilities work. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	

View south from Footpath Croft 27 (High sensitivity receptors) (VP 323-02-002)	
Residents of New Hall Farm and on the south-west edge of Culcheth and footpath users of **high** susceptibility and with **medium** value views, will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Culcheth South embankment. Construction activity will be visible across a large proportion of the view. Large-scale earthworks, construction plant and temporary material stockpiles will be introduced into views of the arable landscape and Silver Lane ponds. However, these new elements will be seen in the context of existing man-made elements including the raised landform of the restored Risley Landfill site. The removal of field boundary vegetation will noticeably change the composition of views and will open up views of construction activity and the emerging structures. For residents on the south-west edge of Culcheth, views of construction works will be largely screened by landform and filtered through woodland along the dismantled railway line. Views for residents of New Hall Farm will be partially screened by intervening farm buildings. Users of Footpath Croft 27 will have sequential and at times oblique views of construction activity as they travel along the footpath. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View east from Newchurch Old Refectory (also known as Newchurch Old Rectory) (High sensitivity receptors) (VP 324-02-004)	
Residents of **high** susceptibility and workers at Taylor Business Park of lower susceptibility both with **medium** value views, will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Culcheth cutting, A574 Warrington Road realignment and overbridge and Culcheth Link Road. Construction activity will be visible across a large proportion of the view. Removal of mature woodland from within the grounds of Newchurch Old Refectory (also known as Newchurch Old Rectory), will open up views of the A574 Warrington Road, Taylor Business Park, construction activity and the emerging structures. A574 Warrington Road satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be new and uncharacteristic elements introduced into views of a residential garden with mature woodland. Construction traffic using the A574 Warrington Road will introduce additional traffic movement into views. Views to the west will continue to be filtered through mature trees within the rectory grounds. Views to the north, south and east will be partially filtered through woodland retained at the boundary of Newchurch Old Refectory (also known as Newchurch Old Rectory). However, the degree of filtering of outward views will be lessened by tree removal. Views for workers at Taylor Business Park will be largely filtered through vegetation on the boundary of the Taylor Business Park and screened by intervening buildings. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View east from Newchurch Old Refectory (also known as Newchurch Old Rectory) (High sensitivity receptors) (VP 324-02-004)	
Night-time effects: Residents will have middle-distance views of the lit A574 Warrington Road satellite compound. However, views will be partially screened by intervening construction works and filtered through garden vegetation and mature trees. The controls on light spill set out in the draft CoCP will limit the change these new light sources will introduce into wider views. At night, there will be a **medium** magnitude of visual change and **moderate** adverse effect.	Level of effect: **Moderate** adverse (significant)

View west from Footpath Croft 19 (High sensitivity receptors) (VP 324-03-002)	
Footpath users and visitors to Culcheth Linear Park of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Culcheth cutting, A574 Warrington Road realignment and overbridge, Culcheth Link Road and demolition works at Glaziers Lane Farm and Phillips Farm. Construction activity will be visible across the entire view. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be new and uncharacteristic elements introduced into views of this otherwise intimate, pastoral landscape with woodland. Construction traffic using Culcheth Link Road will introduce traffic movement into views of grazing pasture. Demolition of buildings at Glaziers Lane Farm and Phillips Farm, and the removal of mature oak trees from field boundaries, will change the composition of views and will open up views of construction activity and the emerging structures. Footpath Croft 19 will be permanently diverted along part of its length, altering sequential views for footpath users. Dense woodland vegetation along the dismantled railway line will partially filter views of construction works for visitors to Culcheth Linear Park. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south-west from Robins Lane, Wigshaw (High sensitivity receptors) (VP 324-02-003)	
Residents of Wigshaw and Blakeley Farm and users of Footpath Croft 8 of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Culcheth Link Road, Culcheth cutting, Wigshaw Lane realignment and overbridge and the demolition at Phillips Farm. Construction activity will be visible across the entire view, with some views filtered through intervening garden vegetation or screened by intervening buildings. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be new and uncharacteristic elements and will replace views across the otherwise intimate arable landscape. The removal of vegetation from the boundary of Partridge Lakes Fishery and demolition at Phillips Farm will noticeably change the composition of views and will further open up views of construction activity and the emerging structures. For residents of Blakeley Farm Cottage, construction works will replace views of woodland at Culcheth Linear Park. Footpath Croft 8 will be temporarily diverted. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View east from Footpath Golborne 105/10 (High sensitivity receptors) (VP 325-03-002)	
Footpath users and residents off Kenyon Lane and Heath Lane of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle and far-distance views due to the presence of large-scale construction works including the construction of Culcheth North embankment and Footpath Croft 8a and 108 overbridge and Culcheth North (Railway) viaduct. Liverpool to Manchester Railway south satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be new and uncharacteristic elements introduced into views of the rural landscape. Construction activity will be visible across a large proportion of the view. However, the lower elements of construction will be partially obscured by the falling landform and some views will be partially filtered through intervening vegetation. Construction traffic using a section of Kenyon Lane will introduce additional traffic movements into views of arable fields and woodland blocks. For residents of Little Covert, including Highfield House and Wilton Grange and for residents further to the south on Kenyon Lane, including Main Lane, views of construction activity and the emerging structures in the middle distance will be largely filtered through intervening woodland and field boundary vegetation. Some views will be partially screened by intervening buildings. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View south-west from Footpath Culcheth and Glazebury 108 (High sensitivity receptor) (VP 325-03-001)	
Residents of Broseley Hall Farm and in residential areas off Broseley Lane and Common Lane, footpath users and visitors to the Leigh Golf Club all of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views due to the presence of large-scale construction works including the construction of Culcheth cutting, Footpath Croft 8a and 108 overbridge and Culcheth North embankment and Culcheth North (Railway) viaduct. Construction plant, earthworks and fencing will be new and uncharacteristic elements introduced into views of the urban edge of Culcheth and will be visible across a proportion of the view. Some views will be partially filtered through intervening vegetation. Woodland along the dismantled railway line will be retained and protected during construction and will effectively filter views of construction works on the south-west side of Culcheth Linear Park. However, taller elements such as cranes will be visible above the line of woodland along the dismantled railway line. Views for some residents will be partially screened by intervening buildings. Footpath Culcheth and Glazebury 108 will be permanently diverted as it crosses the golf course at Leigh Golf Club. Golfers at Leigh Golf Club will have views of construction activity on the north-east side of Culcheth Linear Park, these views will be partially filtered through existing intervening vegetation on the golf course. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in **moderate** adverse significant effects.	Level of effect: **Moderate** adverse (significant)

View east from Footpath Golborne 80/10 (High sensitivity receptors) (VP 325-02-005)	
Residents of Tunnel Top and Clough Farm and footpath users of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Culcheth North (Railway) viaduct, B5207 Wilton Lane realignment and overbridge, Lowton cutting and A580 East Lancashire Road overbridge. The B5207 Wilton Lane and Culcheth north (Railway) viaduct satellite compounds, large-scale earthworks, construction plant, temporary material	Level of effect: **Major** adverse (significant)

View east from Footpath Golborne 80/10 (High sensitivity receptors) (VP 325-02-005)	
stockpiles and fencing will be uncharacteristic elements introduced into views of the arable landscape and woodland and will be visible across the majority of the view. The A580 East Lancashire Road will be temporarily realigned to the south of the existing alignment, bringing traffic movements closer to these visual receptors. Construction traffic using the B5207 Kenyon Lane and the B5207 Wilton Lane will introduce additional traffic movements into views. Demolitions at White's Farm and Birchalls Farm and the removal of vegetation in the areas required for construction, will noticeably change the composition of views and will open up views of construction activity and the emerging structures. Views for most residents will be largely oblique and filtered through intervening vegetation. Views for residents of Clough Farm will be partially screened by intervening farm buildings. Footpath Golborne 80/10 will be temporarily diverted to the west along a proportion of its length. Footpath users will have near-distance views of construction activity as they travel along Footpath Golborne 80/10. There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	
Night-time effects: Residents of Tunnel Top will have middle-distance views of the lit B5207 Wilton Lane satellite compound. This will be a new area of illumination in the view but seen in the in context of existing lighting along the B5207 Wilton Lane. For residents of Clough Farm middle-distance views of the lit B5207 Wilton Lane satellite compound will be partially filtered through intervening vegetation and screened by intervening buildings. The controls on light spill set out in the draft CoCP will limit the change these new light sources will introduce into wider views. At night the magnitude of visual change for residents of Tunnel Top will be **medium**.	Level of effect: **Moderate** adverse (significant)

View north-east from Footpath Golborne 79/10 (High sensitivity receptors) (VP 325-02-004)	
Residents of the B5207 Kenyon Lane and users of Footpath Golborne 79/10 of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views due to the presence of large-scale construction works including the construction of B5207 Wilton Lane realignment and overbridge, Lowton cutting and A580 East Lancashire Road overbridge. B5207 Wilton Lane satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be uncharacteristic elements introduced into views of the arable landscape and urban edge of Golborne. Construction activity will be visible across a medium proportion of the view. The A580 East Lancashire Road will be temporarily realigned to the south of the existing alignment, bringing traffic movements closer to these receptors. Construction traffic using the B5207 Kenyon Lane, the B5207 Wilton Lane and the A580 East Lancashire Road will introduce additional traffic movements into views. Vegetation will be removed within the area required for construction, which will noticeably change the composition of views and will open up views of construction activities and the emerging structures. Views from residential properties will be largely oblique and filtered through intervening garden and field boundary vegetation. Footpath Golborne 79/10 will be temporarily diverted further to the west as it crosses the A580 East Lancashire Road and footpath users will have sequential and largely oblique views of construction activity. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View west from Footpath Golborne 72/10 (High sensitivity receptors) (VP 325-03-003)	
Footpath users and residents along the B5207 Wilton Lane of **high** susceptibility and with **medium** value views will experience a noticeable change to near and middle-distance views due to the presence of large-scale construction works including the construction of B5207 Wilton Lane realignment and overbridge, Lowton cutting and A580 East Lancashire Road overbridge. Liverpool to Manchester Railway north satellite compound and A580 East Lancashire Road satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be uncharacteristic elements introduced into views of arable farmland and infrastructure. Construction activity will be visible across a proportion of the view. Construction traffic using the A580 East Lancashire Road and the B5207 Wilton Lane will introduce additional traffic movements into views. Woodland along the dismantled railway line will partially filter views of the full extent of construction activity to the west. However, taller elements such as cranes will be visible above the treeline. Footpath Golborne 72/10 will be temporarily diverted, and footpath users will have sequential and at times near-distance views of construction activity. Vegetation will be removed within the area required for construction, which will noticeably change the composition of views and will open up views of construction works and the emerging structures. Views for residents in this location will be partially screened by intervening farm buildings and filtered through intervening vegetation. There will be views of construction activity in association with work to underground utilities, to the north of the viewpoint. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View east from Footpath Golborne 76/10 (High sensitivity receptors) (VP 326-02-001)	
Residents of Lowton St Mary's and footpath users of **high** susceptibility and with medium value views will experience a substantial change to near-distance views due to the presence of large-scale construction works during the construction of Lowton cutting, A580 East Lancashire Road overbridge and Carr Brook aqueduct. The A572 Newton Road will be temporarily realigned. Construction activity will be visible across the majority of the view. The A580 East Lancashire Road main compound will foreshorten views to the south and will feature prominently on the skyline. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be uncharacteristic elements introduced into views of arable farmland, woodland belts and the A580 East Lancashire Road. Vegetation will be removed within the area required for construction, which will noticeably change the composition of views. Views for residents of Lowton St Mary's will be largely oblique and partially filtered through intervening garden vegetation. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and high sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Night-time effects: Residents will have near-distance views of the lit A580 East Lancashire Road main compound. Although the compound will be seen in the context of existing light sources, it will increase the extent of artificial lighting in the view. The controls on light spill set out in the draft CoCP will limit the change these new light sources introduce to the wider views. At night, there will be a **medium** magnitude of visual change and **moderate** adverse effect.	Level of effect: **Moderate** adverse (significant)

View south-west from Brancaster Drive (High sensitivity receptors) (VP 326-02-008)	
Residents on Pocket Nook Lane and surrounding roads including Brancaster Drive, Stradbrooke Close and Carr Lane of **high** susceptibility and with medium value views will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Lowton cutting, a maintenance access route, Carr Brook aqueduct and A572 Newton Road overbridge. Construction activity will be visible across a large proportion of the view. However, some views will be partially filtered through intervening garden vegetation and screened by intervening buildings. Views across the arable landscape will be replaced with views of A572 Newton Road satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing. For residents on the southern edge of Brancaster Drive the removal of vegetation along the dismantled railway line will open up views of construction activity and the emerging structures. For residents on the western edge of Brancaster Drive and residents along Pocket Nook Lane, the demolition of buildings and removal of mature vegetation from Lowton Business Park will substantially change the composition of views and will open up views of A580 East Lancashire Road main compound, construction activity and the emerging structures. Construction traffic using Pocket Nook Lane and surrounding roads, will introduce additional traffic movements into near-distance views. Utilities work on Brancaster Drive will bring construction activity closer within the view for residents. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and h**igh** sensitivity will result in a m**ajor** adverse significant effect.	Level of effect: M**ajor** adverse (significant)

View east from the A572 Newton Road (High sensitivity receptor) (VP 326-02-011):	
Residents along the A572 Newton Road of **high** susceptibility and staff, pupils and visitors to Lowton Junior and Infant School of lower susceptibility, all with medium value views, will experience a noticeable change to near and middle-distance views due to the presence of large-scale construction works including the construction of Lowton cutting and A572 Newton Road overbridge. Construction traffic using the A572 Newton Road will introduce additional traffic movements into near-distance views, but these will be seen in the context of traffic on the existing road. The demolition of commercial buildings at Lowton Enterprise Park and removal of mature trees along the A572 Newton Road will change the composition of the view and will open up views of construction activity and the emerging structures. Views for some residents will also be oblique and screened by intervening buildings. For staff and pupils at Lowton Junior and Infant School, of lower susceptibility, views from the playing field to existing vegetation along the eastern boundary of the school, will be replaced with views of site hoardings for the Proposed Scheme. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and high sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View west from Newton Gardens (High sensitivity receptors) (VP 326-02-003)	
Residents of Newton Gardens and Cheetham Fold Farm and visitors to Lowton Common of **high** susceptibility and with **medium** value views will experience a substantial change to near-distance views due to the presence of large-scale construction works during the construction of Lowton cutting and Lowton South embankment. Construction activity will be visible across the majority of the view although some views will be screened by intervening buildings. Views of woodland vegetation along the dismantled railway line and open access land at Lowton Common, will be replaced with views of large-scale earthworks, construction plant, temporary material stockpiles and fencing. Vegetation will be removed within the area required for construction, which will noticeably change the composition of views and will	Level of effect: **Major** adverse (significant)

View west from Newton Gardens (High sensitivity receptors) (VP 326-02-003)	
open up views of construction activity and the emerging structures. Views of residential properties on Hesketh Meadow Lane across the common, will be partially screened by the intervening construction works. The demolition of properties along the A572 Newton Road and removal of mature trees, will change the visual composition. Hesketh Meadows Playing Fields will be permanently relocated. There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	

View east from Cabbala Gardens (High sensitivity receptors) (VP 326-02-010)	
Residents of Hesketh Meadow Lane and Cabbala Gardens of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of A572 Newton Road overbridge, Lowton cutting and Lowton South embankment. Construction activity will be visible across most of the view. Views of woodland vegetation along the dismantled railway line and open access land at Lowton Common will be replaced with large-scale earthworks, construction plant, temporary material stockpiles and fencing. The demolition of buildings on the A572 Newton Road and removal of woodland along the dismantled railway line will substantially change the composition of views compared to the baseline and will open up views of construction activity and the emerging structures. Views of residential properties on Newton Gardens will be partially screened by the intervening construction works There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View east from Footpath Golborne 45/10 (High sensitivity receptors) (VP 326-02-005)	
Residents of Garton Common including Warrens Croft Farm, residents on the edge of Lowton and footpath users of **high** susceptibility and with **medium** value views will experience a substantial change to near-distance views due to the presence of large-scale construction works during the construction of Lowton South embankment, Slag Lane realignment and Slag Lane viaduct. Some views will be partially filtered through intervening vegetation. Slag Lane satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be introduced into views of paddocks, woodland and housing. Views for residents will be partially filtered through intervening garden vegetation or screened by intervening buildings. However, for residents of Garton Common and Warrens Croft Farm, construction works will be visible across the majority of the view. Users of Footpath Golborne 45/10 will have oblique views of construction activity as they travel along the footpath. The removal of intervening field boundary and woodland vegetation will noticeably change the composition of views for all receptors and will open up views of construction activity and the emerging structures. There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south-west from Footpath Golborne 63/10 (High sensitivity receptors) (VP 326-03-004)	
Footpath users of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works during the construction of Lowton South embankment, Slag Lane realignment and Slag Lane viaduct, Footpath Golborne 39/10 diversion and Footpath Golborne 63/10 and Small Brook culvert. Slag Lane satellite compound, construction plant, earthworks, temporary material stockpiles and fencing will be uncharacteristic elements introduced into views of small-scale fields of semi-improved grassland, mature field boundary trees and woodland. Construction activity will be visible across the majority of the view. The removal of intervening field boundary vegetation and mature trees will substantially change the visual composition and will open up views of construction activity and the emerging structures. Footpath Golborne 63/10 and 39/10 will be temporarily diverted and there will be near-distance views of construction activity and the emerging structures as footpath users travel along the diverted footpath. There will be views of construction activity in association with work to underground utilities. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south-east from Footpath Golborne 33/10 (High sensitivity receptors) (VP 327-02-001)	
Residents on the edge of Lowton and footpath users of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Slag Lane realignment, Slag Lane viaduct, Footpath Golborne 33/10 realignment, Footpath Golborne 33/10 accommodation underbridge, and Lowton North embankment. Construction works including fencing, earthworks and temporary material stockpiles will introduce new and uncharacteristic elements into views of rough pasture, woodland and the urban edge of Lowton. Construction elements will be visible across the majority of the view. Slag Lane satellite compound will be visible in the middle distance partially screened by construction works and the emerging structures. The removal of intervening field boundary vegetation will alter the composition of views and will open up views of construction activity and the emerging structures. For residents, views of the Proposed Scheme under construction will be partially filtered through intervening garden vegetation. Footpath Golborne 33/10 will be temporarily realigned, and footpath users will have sequential and often near-distance views of construction activity. There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View west from Saddletree Fold Farm (High sensitivity receptors) (VP 326-02-009)	
Residents of Saddletree Fold Farm of **high** susceptibility and with **medium** value views will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment and Slag Lane realignment and Slag Lane viaduct. Construction activity will be visible across the majority of the view. Views across fields of grazing pasture will be replaced with views of Slag Lane satellite compound which will be located on the boundary of the access track to the farm. Slag Lane satellite compound will obscure views further to the west. Construction traffic using Slag Lane and Byrom Lane will introduce additional vehicle movements into views of	Level of effect: **Major** adverse (significant)

View west from Saddletree Fold Farm (High sensitivity receptors) (VP 326-02-009)	
arable fields. Views of construction activity from the residential farmhouse at Saddletree Fold Farm will be partially screened by intervening farm buildings. Removal of field boundary and roadside vegetation including some mature trees, will open up views of construction works including large-scale earthworks, construction plant, temporary material stockpiles and fencing. There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	
Night-time effects: Residents will have near-distance views of the lit Slag Lane satellite compound. This will be a new area of illumination in a predominantly rural landscape and will increase the extent of artificial lighting in the view. The controls on light spill set out in the draft CoCP will limit the change these new light sources introduce to the wider views. At night, there will be a **high** magnitude of visual change and **major** adverse effect.	Level of effect: **Major** adverse (significant)

View west from Slag Lane (High sensitivity receptor) (VP 326-02-012):	
Residents of Byrom Hall and properties along Slag Lane of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, Slag Lane realignment, Slag Lane viaduct, and Footpath Golborne 33/10 realignment and accommodation underbridge. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be introduced into views of semi-improved grassland and woodland and will be visible across the majority of the view. Some views will be partially filtered through intervening garden vegetation. The removal of vegetation from field boundaries and woodland from within Byrom Wood will substantially change the composition of existing views and will open up views of construction activity and the emerging structures. There will be views of construction activity in association with work to underground utilities. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Night-time effects: Residents will have middle-distance views of the lit Slag Lane satellite compound. This will be a new area of illumination in the rural landscape and will increase the extent of artificial lighting in the view. This new area of illumination will be seen in the context of lighting along Slag Lane. The controls on light spill set out in the draft CoCP will limit the change these new light sources introduce to the wider views. At night, there will be a **medium** magnitude of visual change and **moderate** adverse effect.	Level of effect: **Moderate** adverse (significant)

View west from Footpath Golborne 31/10 (High sensitivity receptor) (VP 327-03-009)	
Footpath users and visitors to Byrom Wood of **high** susceptibility and with **medium** value views will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, Footpath Golborne 31/10 realignment, and Footpath Golborne 31/10 underbridge and Critchley culvert. Large-scale earthworks, construction plant, temporary material stockpiles and fencing will be introduced into views of semi-improved grassland and woodland and will be visible across the majority of the view. The removal of vegetation from field boundaries and Byrom Wood will substantially change the composition of views and will open up views	Level of effect: **Major** adverse (significant)

View west from Footpath Golborne 31/10 (High sensitivity receptor) (VP 327-03-009)	
of construction works and the emerging structures. A section of Footpath Golborne 31/10 will be temporarily realigned and there will be near-distance views of construction activity for footpath users as they travel along realigned Footpath Golborne 31/10. Access to and through Byrom Wood will be restricted by construction activity. Work to underground utilities will result in the removal of additional vegetation from within Byrom Wood. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	

View north-east from Footpath Golborne 30/10 (High sensitivity receptors) (VP 327-03-003)	
Footpath users and residents of the A573 Wigan Road and Lowton Road at Golborne and of Windy Bank Farm and Wigan Road Farm of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, Footpath Golborne 27/10 diversion, Footpath Golborne 27/10 underbridge and Windy Bank culvert, and A573 Wigan Road realignment. Construction plant, earthworks and fencing, will be introduced into views of the rural landscape and will be visible across the majority of the view. Footpath Golborne 30/10 will be temporarily diverted, and footpath users will experience sequential views of construction activity as they travel along the diverted Footpath Golborne 30/10. For residents of Windy Bank Farm and Wigan Road Farm, views of construction activity will be partially screened by intervening farm buildings. For residents along the A573 Wigan Road, views of construction activity will be oblique and partially filtered through intervening garden and field boundary vegetation. Views of construction activity for residents off Lowton Road will be partially filtered through woodland along the dismantled railway line. Construction traffic using the A573 Wigan Road will introduce additional traffic movements into near-distance views. Vegetation will be removed within the area required for construction, which will noticeably change the composition of views. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View west from Footpath Golborne 28/10 (High sensitivity receptor) (VP 327-03-002)	
Footpath users and residents on Lightshaw Lane in the vicinity of Critchley House, of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, Footpath Golborne 31/10 realignment, and Footpath Golborne 31/10 underbridge and Critchley culvert, Construction activity will be visible across much of the view. However, most views will be partially filtered through intervening vegetation. The large-scale elements associated with construction, including construction plant, earthworks, temporary material stockpiles and fencing, will be introduced into views of the low-lying Hey Brook corridor, woodland and the wider agricultural landscape. Users of Footpath Golborne 28/10 will have sequential views of construction activity as they travel along the footpath towards the emerging structures although views will, at times, be oblique. Vegetation will be removed within the area required for construction, which will noticeably change the composition of views. For residents of Critchley House and Hey Brook Farm, views of construction elements and activity will be largely screened by intervening buildings. The combination of the above will result in a **high** magnitude of visual change.	Level of effect: **Major** adverse (significant)

View west from Footpath Golborne 28/10 (High sensitivity receptor) (VP 327-03-002)	
The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	

View south-west from Footpath Golborne 27/10 (High sensitivity receptors) (VP 327-03-008)	
Footpath users and residents of The Old Shippen, Lightshaw Barn and Lightshaw Hall (Grade II*) of **high** susceptibility and with **medium** value views will experience a substantial change to near-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, Lightshaw Lane diversion, Footpath Golborne 27/10 diversion and Footpath Golborne 27/10 underbridge and Windy Bank culvert. The large-scale elements associated with construction, including construction plant, earthworks, temporary material stockpiles and fencing, will be introduced into views of the farmed landscape, and will be visible across the majority of the view. Removal of intervening vegetation and the demolition of properties on Lightshaw Lane will noticeably change the composition of views and will open up views of construction activity and the emerging structures. Footpath Golborne 27/10 will be temporarily diverted, and construction elements will become more prominent in the view as footpath users travel along the Footpath Golborne 27/10 towards the emerging structures. However, views for users of Footpath Golborne 27/10 will be mostly oblique. For residents of Lightshaw Hall (Grade II*), Lightshaw Barn and The Old Shippen views of the construction of the Proposed Scheme will be near distance but largely filtered through garden vegetation. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south from Footpath Ashton-in-Makerfield 25/20 (High sensitivity receptors) (VP 327-02-006)	
Residents of Aye Bridge Farm, Balmer's Farm and footpath users of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large large-scale construction works including the construction of Lowton North embankment, A573 Wigan Road realignment and viaducts and Hey Brook offline overbridge. Construction activity will be visible across a large proportion of the view. However, views will be partially filtered through intervening vegetation and screened by intervening buildings. The large-scale elements associated with construction, including construction plant, earthworks, temporary material stockpiles and fencing, will be uncharacteristic in views of the low-lying, river valley landscape. For residents of Aye Bridge Farm and Balmer's Farm, views across the Hey Brook corridor will be foreshortened and replaced with views of A573 Wigan Road satellite compound. The removal of intervening vegetation will substantially change the composition of views and will open up views of construction activity and the emerging structures. Users of Footpath Ashton-in-Makerfield 25/20 will have sequential and at times near-distance views of construction activity as they travel along the footpath. There will be views of construction activity in association with work to underground utilities. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Night-time effects: Residents will have near-distance views of the lit A573 Wigan Road satellite compound. This will be a new area of illumination within a predominantly rural and unlit landscape and will	Level of effect: **Major** adverse (significant)

View south from Footpath Ashton-in-Makerfield 25/20 (High sensitivity receptors) (VP 327-02-006)	
increase the amount of artificial lighting within the view. However, views will be partially filtered through garden vegetation. The controls on light spill set out in the draft CoCP will limit the change these new light sources introduce to the wider views. At night there will be a **high** magnitude of visual change and **major** adverse effect.	

View south-west from the A573 Wigan Road (High sensitivity receptors) (VP 328-03-001)	
Visitors to the Leeds and Liverpool Canal and residents on the edge of Dover of **high** susceptibility and road users of lower susceptibility, all with **medium** value views, will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, A573 Wigan Road realignment, A573 Wigan Road viaducts and Hey Brook offline overbridge. Some views will be partially filtered through intervening vegetation present along the Leeds and Liverpool Canal and along the A573 Wigan Road. Construction plant, earthworks, temporary material stockpiles and fencing will introduce new and uncharacteristic elements into views of the Hey Brook corridor and Abram Flashes SSSI and will be visible across the majority of the view. A573 Wigan Road satellite compound will be visible in the middle distance partially filtered through intervening vegetation. Construction traffic using the A573 Wigan Road will introduce additional traffic movements into views. Visitors to the Leeds and Liverpool Canal will have near-distance views of construction activity from the canal in the vicinity of Dover Bridge and on arrival and departure from the visitor car park. Further to the south-east, views of construction works from the Leeds and Liverpool Canal long distance footpath will be largely filtered through canal side vegetation. Road users will have sequential views of construction works as they travel along the A573 Wigan Road. The removal of vegetation from within the Hey Brook corridor will substantially change the composition of views. Intervening vegetation and landform will largely screen views of construction works for residents on the southern edge of Abram at Dover. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south-west from Footpath Ashton-in-Makerfield 22/30 (High sensitivity receptors) (VP 328-03-003)	
Footpath users and visitors to Viridor Wood of **high** susceptibility and with **medium** value views will experience a substantial change to near and middle-distance views due to the presence of large-scale construction works including the construction of Lowton North embankment, A573 Wigan Road realignment and viaducts, Hey Brook offline overbridge, WCML box structure, Aye Bridge and Abram embankments and retaining walls, and Footpath Ashton in Makerfield 22/30 accommodation underbridge. The large-scale elements associated with construction, including construction plant, earthworks, temporary material stockpiles and fencing will be introduced into rural views of the Hey Brook corridor and Abram Flashes, and will be visible across the majority of the view. Removal of intervening vegetation will noticeably change the composition of views and will open up views of construction activity and the emerging structures. A573 Wigan Road satellite compound will be visible in the middle distance with views partially filtered through existing vegetation. Construction traffic using the A573 Wigan Road will introduce additional traffic movement into views. A section of Footpath Ashton-in-Makerfield 22/30 will be temporarily closed. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south-west from Footpath Abram 01/10 (High sensitivity receptors) (VP 328-02-005)	
Residents off Lily Lane, including Furlong Close and Epsom Drive, footpath users and visitors to Bamfurlong recreation ground, all of **high** susceptibility, and staff, pupils and visitors of Abram Bryn Gates Primary School of lower susceptibility, all with **medium** value views, will experience a noticeable change to near and middle-distance views due to the presence of large-scale construction works including the construction of Abram cutting. The majority of construction activity will be located to the east of the WCML. Views of construction works will be mostly oblique, and some views will be partially filtered through intervening field boundary and garden vegetation. Bamfurlong satellite compound, large-scale earthworks, construction plant, temporary material stockpiles and fencing will be introduced into views of residential development, woodland, arable farmland and railway infrastructure, and will be visible across much of the view. Removal of intervening woodland vegetation along the WCML will noticeably change the composition of views and will open up views of construction activity and the emerging structures. However, woodland within the Hey Brook corridor will continue to provide the backdrop to oblique middle-distance views of the east. Footpath users and users of the recreation ground will have near-distance views of construction activity. For staff and pupils at Abram Bryn Gate Primary School, views of construction activity in the middle distance, will be largely filtered through intervening vegetation along the school boundary. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View south-west from St John's Church, Abram (High sensitivity receptors) (VP 328-02-004)	
Residents of Abram of **high** susceptibility and with **medium** value views will experience a noticeable change to middle and far-distance views due to the presence of large-scale construction works including the construction of A573 Wigan Road viaducts, Hey Brook offline overbridge, WCML box structure, Aye Bridge embankment, Abram embankment, Footpath Ashton-in-Makerfield 22/30 realignment and Footpath Ashton-in-Makerfield 22/30 accommodation underbridge and Abram cutting, in the middle and far distance. The large-scale elements associated with construction, including Bamfurlong satellite compound, construction plant, earthworks, temporary material stockpiles and fencing, will be introduced into views across the low lying, rural landscape of the Leeds and Liverpool Canal and Hey Brook corridor. Construction activity will be visible across the majority of the view in the middle distance for residents on the western edge of Abram, partially filtered through intervening vegetation. For residents to the north and west of the A573 Wigan Road, views of construction activity will be largely screened by intervening buildings. However, construction traffic using the A573 Wigan Road will introduce additional traffic movements into views for these receptors. Removal of vegetation within the Hey Brook corridor to facilitate construction will noticeably change the composition of views. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View south from the A58 Lily Lane (High sensitivity receptors) (VP 328-02-007)	
Residents on Lily Lane and at Bamfurlong Hall Farm and users of Footpath Abram 02/10 of **high** susceptibility and with medium value views will experience a noticeable change to near	Level of effect:

View south from the A58 Lily Lane (High sensitivity receptors) (VP 328-02-007)	
and middle-distance views due to the presence of large-scale construction works including the construction of Footpath Abram 02/10 diversion, Abram cutting, Abram retaining wall and Hey Brook culvert. The large-scale elements associated with construction, including Bamfurlong satellite compound, construction plant, earthworks, temporary material stockpiles and fencing will be introduced into views of residential properties and woodland and will be visible across a small proportion of the view. The majority of views will be heavily filtered through intervening vegetation. However, the removal woodland along the WCML will open up views of construction activity, the emerging structures and the WCML, for residents and footpath users. The removal of some of the woodland surrounding Bamfurlong Hall Farm to accommodate the construction compound, will noticeably change the composition of views to the far distance. Construction traffic using the A58 Lily Lane will introduce additional traffic movement into views. Footpath Abram 02/10 will be temporarily closed. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and high sensitivity will result in a **moderate** adverse significant effect.	**Moderate** adverse (significant)
Night-time effects Residents will have near-distance views of the lit Bamfurlong satellite compound. This will be a new area of illumination in the largely unlit landscape of the Hey Brook corridor. However, views will be largely filtered through intervening vegetation. The controls on light spill set out in the draft CoCP will limit the change these new light sources introduce to the wider views. At night, there will be a **medium** magnitude of visual change and **moderate** adverse effect.	Level of effect: **Moderate** adverse (significant)

Other mitigation measures

11.4.13 No other mitigation measures are considered reasonably practicable during construction. Not all landscape and visual effects can be mitigated due to the visibility of construction activity and the sensitivity of surrounding receptors.

11.4.14 However, consideration will be given during the detailed design stage to where mitigation planting can be established early in the construction programme to help achieve landscape integration or visual screening at an earlier time.

Summary of likely residual significant effects

11.4.15 The temporary residual significant effects during construction remain as described above. These effects will be temporary and reversible in nature lasting only for the duration of the construction works. These residual effects will generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed by residents, and users of PRoW and main roads within the study area.

11.4.16 The significant effects that will remain after implementation of construction phase mitigation are summarised below:

- moderate adverse effects in relation to one LCA;
- major adverse visual effects at 12 representative residential viewpoint locations;
- moderate adverse visual effects at nine representative residential viewpoint locations;
- major adverse visual effects at eight representative recreational viewpoint locations;

- moderate adverse visual effects at five representative recreational viewpoint locations;
- major adverse night-time visual effects at two representative residential viewpoint locations; and
- moderate adverse night-time visual effects at five representative residential viewpoint locations.

Cumulative effects

Cumulative landscape effects

11.4.17 No significant cumulative temporary effects during construction are anticipated.

Cumulative visual effects

11.4.18 No significant cumulative temporary effects during construction are anticipated.

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 (2038), year 15 (2053) and year 30 (2068) of the Proposed Scheme. A process of iterative design and assessment has been employed, and is ongoing, to avoid or reduce adverse effects during the operation of the Proposed Scheme. Measures that will be integrated into the design of the Proposed Scheme include:

- design of earthworks to tie the engineering earthworks for cuttings (such as Culcheth cutting and Lowton cutting) into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable. Earthworks design also takes account of the relationship to surrounding land uses and management, such as agriculture;
- compensatory woodland planting in areas of loss, using the same species composition and planting types and appropriate planting density. This type of planting will be used to compensate for the partial loss of woodland including Viridor Wood, Byrom Wood and the connectivity of existing habitats. Compensatory woodland planting will also enhance the connectivity of habitats, landscape/green infrastructure and historic landscape features in appropriate locations and soften embankments and viaduct abutments;
- hedgerow replacement and restoration in areas of loss to restore connectivity and landscape pattern using an appropriate palette of hedgerow types and species to tie the Proposed Scheme mitigation into the wider landscape character;

- compensation for loss of field ponds with new wetlands, ecological ponds and wetland enhancement at Nan Holes Brook; and
- mitigation planting to help integrate the Proposed Scheme into the landscape.

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:

- M62 West viaduct, A574 Warrington Road overbridge, B5207 Wilton Lane overbridge, A580 East Lancashire Road overbridge, A572 Newton Road overbridge, Slag Lane viaduct and A573 Wigan Road viaducts;
- the presence of earthworks, including Culcheth cutting, Culcheth North and South embankments, Lowton cutting, Lowton North and South embankments, Aye Bridge embankment and retaining walls, Abram embankment and retaining walls and Abram cutting; and
- other design features and rail infrastructure such as overhead line equipment, fencing, noise fence barriers, overbridges and underbridges for PRoW and farm accommodation access.

11.5.4 Non-significant effects are reported in Volume 5: Appendix LV-001-0MA05.

Landscape assessment

11.5.5 The LCA described in Table 30 will be significantly affected during operation of the Proposed Scheme.

Table 30: Operational phase significant landscape effects

Location	
Hey Brook to Aspull Common Farmland and Flashes	
Year 1: A large proportion of this LCA will be directly affected by the introduction of large-scale infrastructure elements including Lowton cutting, Slag Lane viaduct, realigned Slag Lane, Lowton North embankment, Footpath Golborne 31/10 underbridge and Critchley culvert, realigned A573 Wigan Road, A573 Wigan Road viaducts, Aye Bridge embankment retaining walls, Abram embankment retaining walls, WCML box structure and Abram cutting. The Proposed Scheme will be set in the context of the existing WCML. However, the Proposed Scheme will be at a much larger scale than existing railway infrastructure. Lowton cutting, Lowton South and North embankments, and realigned A573 Wigan Road will bisect this regenerating landscape. Consequently, the landscape pattern will be divided and Footpath Golborne 34/10, 37/10 and 38/10 will have been permanently closed reducing east-west connectivity across this LCA. There will be a change to the landscape setting of Byrom Hall due to the proximity of the Proposed Scheme. Hesketh Meadows Playing Fields will have been permanently relocated. Byrom Wood will be divided by Lowton North embankment. Diversions and culverting of sections of the Hey Brook will alter the character of the floodplain. Train movements will further reduce the perceptual qualities of tranquillity within pockets of this rural landscape. Landscape mitigation planting will not be sufficiently established to contribute to the integration of the Proposed Scheme into its landscape setting.	Level of effect: **Moderate** adverse (significant)

Location	
Due to the moderate scenic value, recreational assets and the diverse land cover values, the landscape has a **medium** susceptibility to change arising from the Proposed Scheme. The introduction of large-scale infrastructure and landform modifications adjacent to existing railway infrastructure will result in a **medium** magnitude of change to the landscape. The **medium** magnitude of change for Hey Brook Farmland and Flashes and its **medium** sensitivity will result in a **moderate** adverse significant effect.	
Year 15: A large proportion of this LCA will continue to be affected by the presence of the Proposed Scheme. The low-lying character of the Hey Brook corridor will be permanently altered due to division of this LCA by the Proposed Scheme. East-west connectivity and recreational assets including Byrom Wood will continue to be bisected. However, maturing mitigation planting will partially integrate the Proposed Scheme into its landscape context. There will continue to be a **medium** magnitude of change and a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30: The greater maturity of mitigation planting will further integrate the Proposed Scheme into its landscape context. However, alteration to the low-lying character of the river floodplain and division of the landscape will remain across a large proportion of this LCA. The **moderate** adverse effect will remain.	Level of effect: **Moderate** adverse (significant)

Visual assessment

Introduction

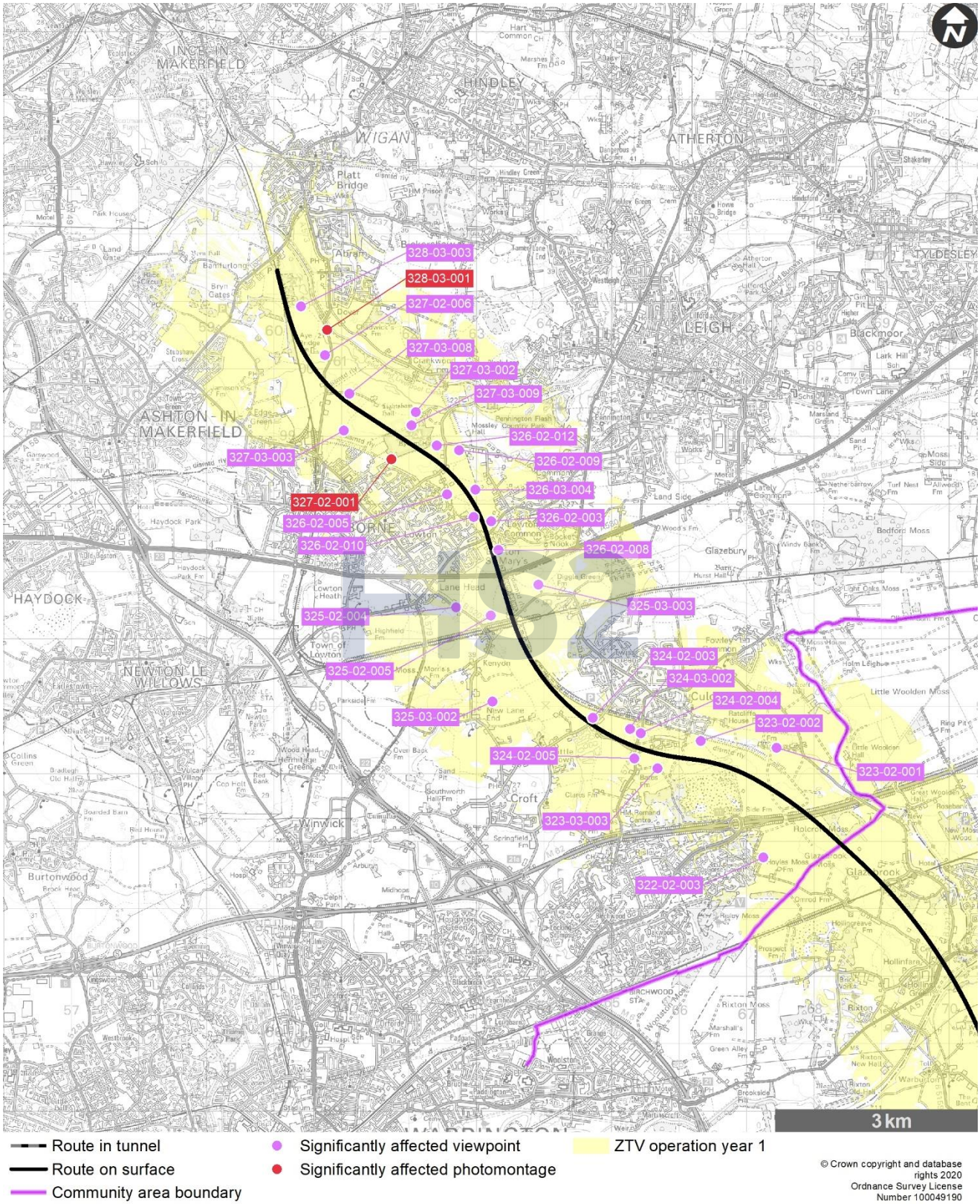
11.5.6 The following section describes the likely significant effects on visual receptors during operation in the winter and summer of year 1 and in the summer of both year 15 and year 30. The year 1 assessment includes the winter period, in line with best practice guidance, to ensure a robust assessment. In some cases, visibility of the operational Proposed Scheme may be reduced during summer when vegetation, if present in a view, will be in leaf. Where visual receptors are predicted to experience significant effects at night-time arising from additional lighting, these are also presented in this section.

11.5.7 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptor. Effects on other receptor types with a lower sensitivity will be lower than those reported.

11.5.8 The visual assessment has identified locations where additional lighting during operation will result in significant effects on visual receptors (summarised in Table 31and described in detail in Volume 5: Appendix LV-001-0MA05 Part 3).

11.5.9 Table 31 identifies the locations where the operation of the Proposed Scheme will potentially result in significant effects. Viewpoint locations are shown in Map Series LV-04 in the Volume 2 MA05 Map Book.

Table 31: Operation phase significant visual effects



View north-east from Footpath Birchwood 25 (High sensitivity receptors) (VP 322-02-003)	
Year 1 – winter and summer: Residents of Omrod Farm, Milverton Farm, New Hall Farm, Railway cottages, Hoyle's Moss Farm and Gorse Covert, along the A574 at Birchwood, and users of Footpath Birchwood 25 of **high** susceptibility, and workers at businesses along the A574 Birchwood Avenue, Daten Avenue and the A574 Birchwood Way of lower susceptibility all with **medium** value views, will experience a noticeable change to middle-distance views. Glazebrook North embankment (in the adjacent Broomedge to Glazebrook area (MA04)), M62 West viaduct, associated overhead line equipment and train movements will be new, linear elements introduced into views of the flat, arable landscape. The Proposed Scheme will be visible across much of the view. Glazebrook North embankment (in the adjacent Broomedge to Glazebrook area (MA04)) and M62 West viaduct will be large-scale elements, elevated relative to existing infrastructure and therefore more prominent within views. However, the Proposed Scheme will be viewed in the context of pre-existing detracting elements including the M62. The loss of vegetation along the M62 during construction will noticeably change the composition of views and will open up views of the M62 and associated traffic movements. Views of the Proposed Scheme from Omrod Farm, Milverton Farm, New Hall Farm, Railway cottages and Hoyle's Moss Farm will be oblique or screened by intervening farm buildings. Views for residents of Gorse Covert, will be partially filtered through intervening garden vegetation. Footpath users will have sequential views of the Proposed Scheme as they travel along the footpath. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View north-east from Footpath Croft 14a (Medium sensitivity receptors) (VP 323-03-003)	
Year 1 – winter and summer: Footpath users of **high** susceptibility and with **medium-low** value views will experience a substantial change to near and middle-distance views. Culcheth cutting, realigned A574 Warrington Road and overbridge will be new large-scale elements introduced into views of the arable landscape and urban edge of Culcheth. The Proposed Scheme will be visible across much of the view; however, some views will be partially filtered through intervening vegetation. Landscape mitigation earthworks will partially screen views of Culcheth cutting. However, overhead line equipment, boundary fencing, and train movements will be visible above the line of Culcheth cutting and will be uncharacteristic elements in near-distance views. A574 Warrington Road overbridge will feature prominently on the skyline and will foreshorten views to the west. Traffic movements and lighting columns along A574 Warrington Road overbridge will be elevated in the view and visible on the skyline. Users of Footpath Croft 14a will have sequential views of the Proposed Scheme as they travel along the footpath. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **medium** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 – summer:	Level of effect: **Moderate**

View north-east from Footpath Croft 14a (Medium sensitivity receptors) (VP 323-03-003)	
A combination of maturing mitigation planting in association with the landscape earthworks will assist in the visual integration of the Proposed Scheme into its landscape context. Near-distance views of realigned A574 Warrington Road and overbridge will be partially filtered through mitigation planting but traffic movements and lighting columns on A574 Warrington Road overbridge will remain visible above the line of planting, across the majority of the view. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	adverse (significant)
Year 30 – summer: Effects will reduce to non-significant by year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: **Minor** adverse (non-significant)

View east along the existing A574 Warrington Road (High sensitivity receptors) (VP 324-02-005)	
Year 1 – winter and summer: Residents along the existing A574 Warrington Road of **high** susceptibility, and with medium value views, will experience a substantial change to near and middle-distance views. Culcheth cutting, realigned A574 Warrington Road and overbridge will be new, large-scale elements introduced into views of the A574 Warrington Road, mature vegetation and arable farmland. The Proposed Scheme will be visible across a large proportion of the view. Oblique views of Culcheth cutting, overhead line equipment and train movements will be largely filtered through intervening vegetation or screened by intervening buildings and landscape earthworks. For residents of Yew Tree Farm, realigned A574 Warrington Road will be further away in the view compared with the baseline. However, realigned A574 Warrington Road will be elevated above the Proposed Scheme on A574 Warrington Road overbridge. The loss of mature vegetation during construction will noticeably change the composition of views compared with the baseline and will open up views of the Proposed Scheme. Views from the rear of residential properties along the west side of the A574 Warrington Road, will be foreshortened by A574 Warrington Road overbridge which will feature prominently on the skyline and replace views across arable fields. However, views will be in the context of the restored Risley Landfill site. Traffic movements along A574 Warrington Road overbridge, will be elevated within views and visible against the skyline for all residents. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and high sensitivity will result in a major adverse significant effect.	Level of effect: Major adverse (significant)
Year 15 – summer: A combination of maturing mitigation planting and landscape earthworks will assist in the integration of Culcheth cutting into oblique views and will partially filter views of A574 Warrington Road overbridge from Yew Tree Farm. Views from the rear of residential properties along the west side of the A574 Warrington Road will continue to be foreshortened by A574 Warrington Road overbridge which will replace views of arable fields and feature prominently on the skyline. Traffic movements and roadside lighting columns along realigned A574 Warrington Road and overbridge will be partially filtered by maturing mitigation planting. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: Effects will reduce to non-significant by year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View east along the existing A574 Warrington Road (High sensitivity receptors) (VP 324-02-005)	
Night-time effects – year 1 Traffic movements and roadside lighting along A574 Warrington Road overbridge will be elevated within views and will be a new area of illumination in the near distance which will be visible from the rear of residential properties on the west side of the A574 Warrington Road. However, views will be partially filtered through intervening vegetation and viewed in the context of existing light sources at Taylor Business Park. The lights will be designed to reduce the visual impact of the lighting installation. At night there will be a **medium** magnitude of visual change and a **moderate** adverse (significant) effect.	Level of effect: **Moderate** adverse (significant)
Night-time effects year 15 and 30 Effects will reduce to non-significant in years 15 and 30 due to the growth and maturity of mitigation planting. This will screen the majority of the lighting arising from the Proposed Scheme (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south from Footpath Culcheth and Glazebury 148 (High sensitivity receptors) (VP 323-02-001)	
Year 1 – winter and summer: Residents of Franks Farm, Brookside, Sunnymead, Hanging Birch Farm and surrounding properties and footpath users of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle and far-distance views. M62 West viaduct, Culcheth South embankment, M62 auto-transformer station, Risley East accommodation underbridge and Footpath Croft 13 accommodation underbridge will be new, elements introduced into views of the arable landscape. The Proposed Scheme will be visible across a proportion of the view. Train movements and overhead line equipment will be visible across the top of M62 West viaduct and Culcheth South embankment. Some views will be partially obscured by the raised landform of the dismantled railway line and filtered through intervening vegetation. The loss of vegetation along the M62 during construction will open up views of the M62 and associated traffic movements in the far distance. Views from residential properties will be further filtered through garden vegetation. Footpath users will have sequential and at times oblique views of the Proposed Scheme. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south from Footpath Croft 27 (High sensitivity receptors) (VP 323-02-002)	
Year 1 – winter and summer: Residents of New Hall Farm and on the south-west edge of and footpath users of **high** susceptibility and with **medium** value views, will experience a substantial change to middle-distance views. Culcheth South embankment will be a new element in views of low-lying farmland and Silver Lane Ponds but will be viewed in the context of the restored Risley Landfill site. The lower slopes of Culcheth South embankment will be partially screened by landscape earthworks. Overhead line equipment, train movements and boundary fencing will be new and uncharacteristic elements introduced into views across the arable landscape. For residents in Culcheth, views of the Proposed Scheme will be largely filtered through woodland on the raised landform of the dismantled railway line. For residents of New Hall Farm, views of	Level of effect: **Major** adverse (significant)

View south from Footpath Croft 27 (High sensitivity receptors) (VP 323-02-002)	
the Proposed Scheme will be partially screened by intervening buildings and filtered through garden vegetation. Footpath users will have open and at times near-distance views of the Proposed Scheme. The loss of vegetation during construction will noticeably change the composition of views compared with the baseline. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	
Year 15 – summer: Maturing mitigation planting in association with landscape earthworks will partially filter views and assist in visual integration of Culcheth South embankment. Overhead line equipment and train movements will remain visible along the top of Culcheth South embankment across much of the view, although partially filtered through intervening trees. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: Effects will reduce to non-significant by year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View east from Newchurch Old Refectory (also known as Newchurch Old Rectory) (High sensitivity receptors) (VP 324-02-004)	
Year 1 – winter and summer: Residents of **high** susceptibility and workers at Taylor Business Park of lower susceptibility both with **medium** value views, will experience a substantial change to near and middle-distance views. Culcheth cutting, realigned A574 Warrington Road, overbridge and Culcheth Link Road will be new and uncharacteristic large-scale elements introduced into views of a residential garden and mature woodland. The Proposed Scheme will be visible across a large proportion of the view. Realigned A574 Warrington Road will have moved further away within the view compared to the baseline. However, realigned A574 Warrington Road will be elevated as it crosses over the Proposed Scheme on A574 Warrington Road overbridge. Mature trees within the grounds of Newchurch Old Refectory (also known as Newchurch Old Rectory), will partially filter views of traffic movements and lighting columns on the overbridge. However, where trees were removed in construction, views for residents will remain open to Taylor Business Park, traffic movements along realigned A574 Warrington Road and Culcheth Link Road in the middle distance. Oblique views of Culcheth cutting, overhead line equipment and train movements will be largely filtered through intervening vegetation and screened by landscape earthworks. Views for workers at Taylor Business Park will be largely filtered through intervening vegetation and screened by intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Year 15 – summer: A combination of maturing mitigation planting and landscape earthworks will assist in the integration of Culcheth cutting, realigned A574 Warrington Road and overbridge and Culcheth Link Road into views. Views of Taylor Business Park will be partially filtered through maturing mitigation planting along realigned A574 Warrington Road.	Level of effect: **Moderate** adverse (significant)

View east from Newchurch Old Refectory (also known as Newchurch Old Rectory) (High sensitivity receptors) (VP 324-02-004)	
The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	
Year 30 – summer: Effects will reduce to non-significant by year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View west from Footpath Croft 19 (High sensitivity receptors) (VP 324-03-002)	
Year 1 – winter and summer: Footpath users and visitors to Culcheth Linear Park of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Culcheth cutting, realigned A574 Warrington Road, overbridge and Culcheth Link Road will be new and uncharacteristic large-scale elements introduced into views of the otherwise pastoral landscape. The Proposed Scheme will be visible across a large proportion of the view. Traffic movements along Culcheth Link Road will be introduced into near-distance views of pastoral fields with woodland. The loss of buildings at Glaziers Lane Farm and Phillips Farm and the loss of mature oak trees from field boundaries during construction will change the composition of views compared to the baseline and will open up views of the Proposed Scheme. Landscape earthworks will partially mitigate views of Culcheth cutting. However, overhead line equipment, boundary fencing and train movements will be visible above the line of Culcheth cutting and will be uncharacteristic, new elements in views. Views of the Proposed Scheme for visitors to Culcheth Linear Park will be largely filtered through intervening woodland. A section of Footpath Croft 19 will have been permanently diverted along the former alignment of the A574 Warrington Road. A574 Warrington Road overbridge will be elevated within the view, with traffic movements and roadside lighting columns visible against the skyline for users of the diverted Footpath Croft 19. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Year 15 – summer: Maturing mitigation planting in association with landscape earthworks will partially filter views of Culcheth cutting, train movements and overhead line equipment and realigned A574 Warrington Road and overbridge. There will be near distance and partially filtered views of traffic movements along Culcheth Link Road as users of Footpath Croft 19 cross the existing A574 Warrington Road. Views across the wider landscape will be foreshortened by mitigation planting along the line of the Proposed Scheme. Views of the Proposed Scheme for visitors to Culcheth Linear Park will continue to be filtered through intervening woodland. For users of the diverted Footpath Croft 19, traffic movements and roadside lighting columns along the top of A574 Warrington Road overbridge will remain visible above the line of mitigation planting. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will continue to filter views of the Proposed Scheme. However, views across the wider landscape will continue to be foreshortened by mitigation planting and the A574 Warrington Road overbridge. The A574 Warrington Road overbridge will feature prominently on the skyline for users of the diverted Footpath Croft 19. The magnitude of visual change will remain **medium** and effects will be **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)

View south-west from Robins Lane, Wigshaw (High sensitivity receptors) (VP 324-02-003)	
Year 1 – winter and summer: Residents of Wigshaw and Blakeley Farm and users of Footpath Croft 8 of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. The Proposed Scheme will be visible across the majority of the view. Views for some residents will be partially filtered through intervening garden vegetation or screened by intervening buildings. However, the majority of views for users of Footpath Croft 8 will be near distance and open. Culcheth Link Road, Culcheth cutting, realigned Wigshaw Lane and overbridge, will be new and large-scale elements introduced into views of the arable landscape and woodland and will alter the appearance of landform. Wigshaw Lane overbridge will replace views of arable farmland and woodland along the dismantled railway line, to the north-west. Traffic movements and lighting columns along Wigshaw Lane overbridge will be elevated and visible in skyline views, particularly at night. Landscape earthworks will partially mitigate views of Culcheth cutting. However, boundary fencing, overhead line equipment and train movements will be visible above the line of Culcheth cutting. The presence of the Proposed Scheme will foreshorten views across the arable landscape. The loss of vegetation and demolition at Phillips Farm during construction will noticeably change the composition of views compared with the baseline. Footpath Croft 8 will have been permanently diverted. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Year 15 – summer: A combination of maturing mitigation planting in association with landscape earthworks will partially integrate the Proposed Scheme into views of the arable landscape. However, the Proposed Scheme and associated planting will continue to foreshorten views across the wider landscape to the south and west. For residents of Blakeley Farm Cottage, views of woodland along the dismantled railway line will be replaced by views of mitigation woodland along Culcheth cutting. Wigshaw Lane overbridge will continue to replace views of arable farmland and woodland to the north. Train movements and overhead line equipment will continue to be uncharacteristic elements in near-distance views, above the line of Culcheth cutting, partially filtered through intervening vegetation. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will further screen views of the Proposed Scheme. However, views across the landscape will continue to be foreshortened compared to the baseline. The magnitude of visual change will remain **medium** and effects will remain **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)
Night-time effects – year 1 Traffic movements and roadside lighting along Wigshaw Lane overbridge will be more prominent in the view at night due to the elevated position of Wigshaw Lane overbridge. Roadside lighting will be visible in skyline views at night in an area of previously unlit landscape. The lights will be designed to reduce the visual impact of the lighting installation. At night there will be a **medium** magnitude of visual change and a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Night-time effects year 15 and 30	Level of effect: Non-significant

View south-west from Robins Lane, Wigshaw (High sensitivity receptors) (VP 324-02-003)	
Effects will reduce to non-significant in years 15 and 30 due to the growth and maturity of mitigation planting. This will screen the majority of the lighting arising from the Proposed Scheme (reported in detail in Volume 5: Appendix LV-001-0MA05).	

View east from Footpath Golborne 105/10 (High sensitivity receptors) (VP 325-03-002)	
Year 1 – winter and summer: Footpath users and residents off Kenyon Lane and Heath Lane of **high** susceptibility and with **medium** value views, will experience a noticeable change to skyline views. Culcheth North embankment will be a new large-scale element introduced into views across the rural landscape and will feature prominently on the skyline. The Proposed Scheme will be a new and elevated linear element visible across a large proportion of the view and will replace views of the woodland belt along Culcheth Linear Park. However, views of the lower slopes of the embankment will be partially screened by landform as it falls away towards the Proposed Scheme and will also be partially filtered through intervening vegetation. Boundary fencing, overhead line equipment and train movements along the top of the embankment will be viewed against the skyline. Footpath Croft 8a and 108 overbridge will be a new high level structure rising above the line of the embankment. For residents of Little Covert including Highfield House and Wilton Grange and for residents further to the south on Kenyon Lane, including Main Lane, views of the Proposed Scheme in the middle distance will be largely filtered through intervening woodland and field boundary vegetation. Some views will be partially screened by intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View east from Footpath Golborne 80/10 (High sensitivity receptors) (VP 325-02-005)	
Year 1 – winter and summer: Residents of Tunnel Top and Clough Farm and footpath users of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views. Culcheth North (Railway) viaduct, B5207 Wilton Lane auto-transformer station, Lowton cutting, realigned B5207 Wilton Lane and the B5207 Wilton Lane overbridge will be new elements introduced into views of the flat arable landscape and woodland. The Proposed Scheme will be in Lowton cutting, however, boundary fencing, noise fence barriers, overhead line equipment and the tops of train movements will be visible above the top of the cutting, across the majority of the view. The B5207 Wilton Lane overbridge will be visible on the skyline across a small proportion of the view. Traffic movements across the overbridge will be visible particularly at night due to the car headlights. The majority of views will be partially filtered through intervening vegetation. The loss of buildings at White's Farm and Birchalls Farm, and vegetation lost during construction, will noticeably change the composition of views compared to the baseline. Footpath Golborne 80/10 will have been reinstated to its original alignment. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change.	Level of effect: **Moderate** adverse (significant)

View east from Footpath Golborne 80/10 (High sensitivity receptors) (VP 325-02-005)	
The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View north-east from Footpath Golborne 79/10 (High sensitivity receptors) (VP 325-02-004)	
Year 1 – winter and summer: Residents of the B5207 Kenyon Lane and users of Footpath Golborne 79/10 of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views. The B5207 Wilton Lane auto-transformer station, Lowton cutting and realigned B5207 Wilton Lane and overbridge will be new, large-scale, elements introduced into views of the arable landscape and urban edge of Golborne. B5207 Wilton Lane overbridge will be an elevated structure within views of this otherwise flat landscape and will feature prominently on the skyline in views to the south-east. Traffic moving across the overbridge will be elevated and visible against the skyline, particularly due to the presence of vehicular lights at night. The A580 East Lancashire Road will be elevated as it crosses Lowton cutting on A580 East Lancashire Road overbridge and will therefore be more noticeable within the view compared with the baseline. Boundary fencing, noise fence barriers, overhead line equipment and train movements will be visible above the top of Lowton cutting, despite its depth, partially filtered through intervening vegetation. The Proposed Scheme will be visible across the majority of the view. The loss of vegetation during construction will noticeably change the composition of views compared to the baseline and will open up views of the Proposed Scheme. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

Views west from Footpath Golborne 72/10 (High sensitivity receptors) (VP 325-03-003)	
Year 1 – winter and summer: Footpath users and residents along the B5207 Wilton Lane of **high** susceptibility and with **medium** value views, will experience noticeable changes to middle-distance views. Lowton cutting, realigned B5207 Wilton Lane and overbridge and A580 East Lancashire Road overbridge will be new large-scale structures introduced into views of the arable landscape and the A580 East Lancashire Road. Some views will be partially filtered through intervening vegetation. The A580 East Lancashire Road will be elevated as it crosses Lowton cutting on A580 East Lancashire Road overbridge and will therefore be more noticeable within the view compared with the baseline. B5207 Wilton Lane overbridge will be a new raised element in the view. Roadside lighting columns and traffic movements along B5207 Wilton Lane overbridge will be elevated within the view and viewed against the skyline. The loss of buildings at White's Farm and Birchalls Farm and vegetation during construction, will change the composition of views compared to the baseline and will open up views of the Proposed Scheme. Woodland retained along the dismantled railway line will effectively filter views of Lowton cutting and	Level of effect: **Moderate** adverse (significant)

Views west from Footpath Golborne 72/10 (High sensitivity receptors) (VP 325-03-003)	
train movements across a proportion of the view. Users of Footpath Golborne 72/10 will have sequential and partially filtered views of the Proposed Scheme as they travel along the footpath. Views for residents will be partially filtered through intervening vegetation or screened by intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south-west from Brancaster Drive (High sensitivity receptors) (VP 326-02-008)	
Year 1 – winter and summer: Residents on Pocket Nook Lane and surrounding roads including Brancaster Drive, Stradbrooke Close and Carr Lane of **high** susceptibility and with medium value views, will experience a noticeable change to near and middle-distance views. Large-scale elements including Lowton cutting and noise fence barriers will be introduced into views of the otherwise arable landscape and urban edge of Golborne. The Proposed Scheme will be visible across a moderate proportion of the view. For residents on the southern edge of Brancaster Drive, loss of woodland vegetation along the dismantled railway line will change views to the south, and will open up wide views of Lowton cutting, overhead line equipment and train movements which will be visible above the line of Lowton cutting. For residents on the western edge of the residential area, views of the Lowton Business Park will be replaced with views of noise fence barriers along the line of Lowton cutting. For residents along Pocket Nook Lane, views of the Proposed Scheme will largely be screened by intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and h**igh** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View west from Newton Gardens (High sensitivity receptors) (VP 326-02-003)	
Year 1 – winter and summer: Residents of Newton Gardens and Cheetham Fold Farm and visitors to Lowton Common of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Large-scale elements including Lowton cutting, Lowton South embankment and Slag Lane telecommunications site, will replace views of woodland and recreational open space. Lowton cutting, Lowton South embankment and Slag Lane telecommunication site will be new and uncharacteristic elements in views and will be visible across the majority of the view. Landscape earthworks will partially integrate Lowton cutting into views. However, boundary fencing, overhead line equipment and noise fence barriers will be visible above the line of Lowton cutting. Trains movements will be visible as trains emerge	Level of effect: **Major** adverse (significant)

View west from Newton Gardens (High sensitivity receptors) (VP 326-02-003)	
from Lowton cutting and onto Lowton South embankment. The loss of properties on the A572 Newton Road during construction will have changed the composition of views compared with the baseline. Views of residential properties on Hesketh Meadow Lane will be partially screened by the Proposed Scheme. The partial loss of woodland along the dismantled railway line will open up views of the Proposed Scheme for visitors to Lowton Common. Views for residents will be partially filtered through intervening vegetation and some views will be screened by intervening buildings. Hesketh Meadows Playing Fields will have been permanently relocated. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	
Year 15 – summer: Maturing mitigation planting including planting around properties on Newton Gardens and in association with landscape earthworks, will partially integrate Lowton cutting, Lowton South embankment and Slag Lane telecommunications site into views. Views of properties on Hesketh Meadow Lane will be partially filtered through intervening woodland. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will further filter views of the Proposed Scheme. Views for residents and visitors to Lowton Common will be across open access land towards woodland in the middle distance, with views of properties on Hesketh Meadow Lane heavily filtered through intervening woodland. The magnitude of visual change will remain **medium** and effects will remain **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)

View east from Cabbala Gardens (High sensitivity receptors) (VP 326-02-010)	
Year 1 – winter and summer: Residents of Hesketh Meadow Lane and Cabbala Gardens of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Large-scale elements including Lowton cutting and Lowton South embankment will replace views of woodland vegetation and open recreational space. Lowton cutting and Lowton South embankment will be new and uncharacteristic elements within views, altering the appearance of landform and representing a change to land use. They will be visible across the majority of the view. Landscape earthworks will partially integrate the Lowton cutting into views. However, train movements, overhead line equipment and noise fence barriers will be visible as the Proposed Scheme extends beyond Lowton cutting and onto Lowton South embankment. The loss of vegetation and buildings on the A572 Newton Road during construction will have opened up views of Lowton cutting, Lowton South embankment, residential properties on Newton Gardens, traffic movements and lighting columns along the A572 Newton Road. Views for residents of Cabbala Gardens will be partially filtered through intervening garden vegetation. Views for residents on Hesketh Meadow Lane will be partially screened by intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View east from Cabbala Gardens (High sensitivity receptors) (VP 326-02-010)	
Year 15 – summer: Maturing mitigation planting in association with landscape earthworks, will partially integrate Lowton cutting and Lowton South embankment into views. However, due to the scale of these elements they will remain incongruous in views of the low lying Lowton Common open access space and linear woodland. Noise fence barriers, overhead line equipment and train movements will be visible in the middle distance as the Proposed Scheme extends beyond Lowton cutting and onto Lowton South embankment. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will further filter views of the Proposed Scheme. However, due to the scale of the cutting and embankment, the Proposed Scheme will remain prominent in views. The magnitude of visual change will remain medium and effects will remain moderate adverse (significant).	Level of effect: **Moderate** adverse (significant)

View east from Footpath Golborne 45/10 (High sensitivity receptors) (VP 326-02-005)	
Year 1 – winter and summer: Residents of Garton Common including Warrens Croft Farm, residents on the edge of Lowton and footpath users of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Lowton South embankment, realigned Slag Lane and Slag Lane telecommunications site will be new, large-scale elements introduced into views of low-lying paddocks and housing on the edge of Lowton. The Proposed Scheme will be visible across the majority of the view. The raised form of Lowton South embankment will foreshorten views and feature prominently on the skyline in views to the east. Overhead line equipment, noise fence barriers, boundary fencing, and train movements will be uncharacteristic elements within the views and will be visible along the top of Lowton South embankment and viewed against the skyline. Realigned Slag Lane will bring traffic movements and associated lighting columns closer within views. However, realigned Slag Lane will be in cutting as it crosses underneath the Proposed Scheme and views will be partially filtered through intervening vegetation. The loss of mature trees and woodland will notably change the composition of views compared to the baseline and will open up views of the Proposed Scheme. Views for residents will be partially filtered through intervening vegetation and screened by intervening buildings. Footpath users will have sequential and oblique views of the Proposed Scheme on Lowton South embankment as they travel along Footpath Golborne 45/10. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Year 15 – summer: Maturing mitigation planting will partially filter views of the Proposed Scheme for residents on the edge of Lowton and users of Footpath Golborne 45/10. For residents of Garton Common and Warrens Croft Farm, maturing mitigation planting will partially filter views of the lower slopes of Lowton South embankment. However, the embankment will continue to foreshorten views to the east. Noise fence barriers, overhead line equipment and train movements will remain visible along the top of the embankment although these views will be partially filtered through mitigation planting. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View east from Footpath Golborne 45/10 (High sensitivity receptors) (VP 326-02-005)	
Year 30 – summer: The magnitude of visual change will be reduced to non-significant as a result of maturing planting (reported in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south-west from Footpath Golborne 63/10 (High sensitivity receptors) (VP 326-03-004)	
Year 1 – winter and summer: Footpath users of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Lowton South embankment, realigned Slag Lane and Slag Lane viaduct, permanently diverted Footpath Golborne 39/10, Footpath Golborne 63/10 underbridge and Small Brook culvert and Slag Lane telecommunications site will be new, large-scale elements introduced into views of fields of semi-improved grassland, mature field boundary trees and woodland. The Proposed Scheme will be visible across the majority of the view. The embankment will be a new raised element which will be uncharacteristic within this otherwise low-lying landscape. The embankment will foreshorten views to the west and will feature prominently within the skyline. Noise fence barriers, overhead line equipment and train movements will be visible along the top of the embankment from the point at which the Proposed Scheme extends beyond Lowton cutting and onto Lowton South embankment. The loss of mature trees during construction will substantially change the visual composition and will open up views of the Proposed Scheme on embankment. Footpath Golborne 63/10 will have been permanently realigned and users will have sequential views of the Proposed Scheme as they travel along diverted footpath. Views will be near distance and direct as the footpath passes beneath the Proposed Scheme through Footpath Golborne 63/10 underbridge and culvert. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of the above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Year 15 – summer: Views of Lowton South embankment, realigned Slag Lane and Slag Lane viaduct, diverted Footpath Golborne 39/10, Footpath Golborne 63/10 underbridge and Small Brook culvert and Slag Lane telecommunications site will be partially filtered through maturing mitigation planting. However, the Proposed Scheme will continue to foreshorten views to the west and will feature prominently on the skyline. Noise fence barriers, overhead line equipment and moving trains will be visible above the line of mitigation planting from the point at which the Proposed Scheme extends beyond Lowton cutting and onto Lowton South embankment. Footpath users will have sequential views of the Proposed Scheme as they travel along realigned footpath, with some near-distance views as the footpath passes through the underbridge and culvert. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: Mitigation planting will largely filter views of the noise fence barriers, overhead line equipment and moving trains on Lowton South embankment. However, views to the west will continue to be foreshortened by the presence of the embankment and footpath users will continue to experience sequential and at times near-distance views of the Proposed Scheme as they travel along realigned footpath. The magnitude of visual change will remain **medium** and effects will remain **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)

View south-east from Footpath Golborne 33/10 (High sensitivity receptors) (VP 327-02-001)	
Year 1 – winter and summer: Residents on the edge of Lowton and footpath users of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views. Slag Lane viaduct, realigned Footpath Golborne 33/10 and Footpath Golborne 33/10 accommodation underbridge, and Lowton North embankment will be new, large-scale elements introduced into views of rough pasture, woodland and the urban edge of Lowton. Lowton North embankment, noise fence barriers, overhead line equipment and train movements will be uncharacteristic elements within views. However, most views will be partially filtered through intervening vegetation. The loss of woodland from Byrom Wood during construction will noticeably change the composition of views and will open up views of the Proposed Scheme. Views for residents on the edge of Lowton, will be partially filtered through intervening garden vegetation. Footpath Golborne 33/10 will have been realigned, and footpath users will have near-distance views of the Proposed Scheme as they travel through Footpath Golborne 33/10 accommodation underbridge. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect. A photomontage illustrating this scenario is included Volume 5: Appendix LV-001-0MA05.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05). A photomontage illustrating this scenario is included Volume 5: Appendix LV-001-0MA05.	Level of effect: Non-significant

View west from Saddletree Fold Farm (High sensitivity receptors) (VP 326-02-009)	
Year 1 – winter and summer: Residents of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views. Lowton North embankment, noise fence barriers and overhead line equipment will be new, large-scale elements introduced into views of the rural landscape and will feature prominently on the skyline across the majority of the view. Lowton North embankment will be a high-level structure and an uncharacteristic landform in relation to existing views of low-lying pasture. Train movements will be visible along the top of Lowton North embankment. Views of Lowton North embankment will be largely screened by intervening buildings at Saddletree Fold Farm and along realigned Slag Lane. Realigned Slag Lane will bring views of traffic movements and associated lighting columns closer to these visual receptors. The loss of vegetation during construction will noticeably change the composition of views and will open up views of the Proposed Scheme on Lowton North embankment and realigned Slag Lane. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View west from Slag Lane (High sensitivity receptor) (VP 326-02-012):	
Year 1 – winter and summer: Residents of Byrom Hall and properties along Slag Lane of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Lowton North embankment, realigned Slag Lane, Slag Lane viaduct, and realigned Footpath Golborne 33/10 and accommodation underbridge will be new large-scale elements, introduced into views of semi-improved grassland and woodland. The Proposed Scheme will be visible across the majority of the view, with some views partially filtered through intervening vegetation. Lowton North embankment will be a raised structure in views of the otherwise low-lying pastoral and woodland landscape. Lowton North embankment will permanently foreshorten views to the west, replacing views across the wider rural landscape and will feature prominently on the skyline. Train movements, overhead line equipment and noise fence barriers will be visible along the top of Lowton North embankment. The existing Slag Lane alignment will remain open for access to properties. Traffic movements and roadside lighting along realigned Slag Lane will be visible further to the east compared with the baseline. The loss of vegetation from field boundaries and Byrom Wood during construction will substantially change the composition of the view and will open up views of the Proposed Scheme on Lowton North embankment. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)
Year 15 – summer: Maturing mitigation planting and intervening vegetation will partially filter views of the lower slopes of Lowton North embankment and realigned Slag Lane in the near and middle-distance. However, views across the wider rural landscape will continue to be foreshortened by Lowton North embankment which will feature prominently on the skyline in views to the west. Noise fence barriers, overhead line equipment and train movements will be visible along the top of Lowton North embankment in views partially filtered through intervening vegetation and mitigation planting. Mitigation planting along realigned Slag Lane will foreshorten views to the east and will replace views across semi-improved grassland to woodland along the dismantled railway line. The magnitude of visual change will remain **high** and effects will be **major** adverse (significant).	Level of effect: **Major** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will further filter views of the Proposed Scheme. However, views across the wider rural landscape to the west will continue to be foreshortened by Lowton North embankment. Views to the east will continue to be foreshortened by mitigation planting along realigned Slag Lane. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)

View west from Footpath Golborne 31/10 (High sensitivity receptor) (VP 327-03-009)	
Year 1 – winter and summer: Footpath users and visitors to Byrom Wood of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Lowton North embankment and Footpath Golborne 31/10 underbridge and Critchley culvert will be new large-scale elements, introduced into views of semi-improved grassland and woodland. The Proposed Scheme will be visible across the majority of the view, with some views partially	Level of effect: **Major** adverse (significant)

View west from Footpath Golborne 31/10 (High sensitivity receptor) (VP 327-03-009)	
filtered through woodland. Lowton North embankment will permanently foreshorten views to the west for users of Footpath Golborne 31/10 and will feature prominently on the skyline. Train movements, overhead line equipment and noise fence barriers will be visible along the top of Lowton North embankment. Footpath Golborne 31/10 will have been permanently realigned and there will be sequential views of the Proposed Scheme for footpath users as they pass through Footpath Golborne 31/10 underbridge and Critchley culvert. For visitors to Byrom Wood, Lowton North embankment will foreshorten views across the wood and views of the Proposed Scheme will be near distance at times as visitors walk through the wood. The loss of vegetation during construction will substantially change the composition of views and will open up views of the Proposed Scheme on Lowton North embankment. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	
Year 15 – summer: Maturing mitigation planting and intervening field boundary vegetation will partially filter views of the lower slopes of Lowton North embankment. However, views across the wider rural landscape will continue to be foreshortened by Lowton North embankment which will feature prominently on the skyline in views to the west. Noise fence barriers, overhead line equipment and train movements will be visible along the top of Lowton North embankment, partially filtered through mitigation planting. There will continue to be near-distance views of Lowton North embankment as users of realigned Footpath Golborne 31/10 travel along the footpath and through Footpath Golborne 31/10 underbridge and Critchley culvert. For visitors to Byrom Wood, the presence of Lowton North embankment will continue to foreshorten views across the wood with the majority of views partially filtered through intervening trees. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: Mature mitigation planting will further filter views of Lowton North embankment, noise fence barriers, overhead line equipment and train movements. However, views across the rural landscape and Byrom Wood will be foreshortened by Lowton North embankment. Users of realigned Footpath Golborne 31/10 and visitors to Byrom Wood will continue to have near-distance views of the Proposed Scheme as they walk through the wood and travel through Footpath Golborne 31/10 underbridge and Critchley culvert. The magnitude of visual change will remain **medium** and effects will be **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)

View north-east from Footpath Golborne 30/10 (High sensitivity receptors) (VP 327-03-003)	
Year 1 – winter and summer: Footpath users and residents of the A573 Wigan Road and Lowton Road at Golborne and of Windy Bank Farm and Wigan Road Farm of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views. Lowton North embankment and Lightshaw Lane telecommunications site will be new large-scale elements introduced into views of the rural landscape of Lightshaw Meadows SSSI and will be visible across the majority of the view. Some views will be partially filtered through intervening vegetation. The raised form of Lowton North embankment will be an uncharacteristic landform within the gently undulating arable landscape. Overhead line equipment and train movements will be visible along the top of Lowton North embankment. Footpath Golborne 30/10 will have been permanently diverted and there will be sequential views of the Proposed Scheme as footpath users travel along the diverted footpath. For residents along the A573 Wigan Road, views of	Level of effect: **Moderate** adverse (significant)

View north-east from Footpath Golborne 30/10 (High sensitivity receptors) (VP 327-03-003)	
the Proposed Scheme will be oblique and partially filtered through intervening garden and field boundary vegetation. For residents of Lowton Road, views of the Proposed Scheme will be largely filtered through woodland along the dismantled railway line. The loss of vegetation during construction will noticeably change the composition of views and will open up views of the Proposed Scheme. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View west from Footpath Golborne 28/10 (High sensitivity receptor) (VP 327-03-002)	
Year 1 – winter and summer: Footpath users and residents on Lightshaw Lane in the vicinity of Critchley House, of **high** susceptibility and with **medium** value views, will experience a noticeable change to middle-distance views, across a proportion of the view. Lowton North embankment, Footpath Golborne 31/10 underbridge and Critchley culvert, and Lightshaw Lane telecommunications site will be new, large-scale structures introduced into views across the low-lying rural landscape of the Hey Brook corridor. There will be views of boundary fencing, overhead line equipment and train movements along the top of Lowton North embankment, partially filtered through intervening field boundary and woodland vegetation. There will be sequential views of the Proposed Scheme for footpath users as they travel along Footpath Golborne 28/10. Lowton North embankment will feature prominently on the skyline in views to the west, with views of the lower slopes partially filtered through intervening vegetation on the valley floor. The loss of vegetation from within the Hey Brook corridor during construction will noticeably change the composition of views and will open up views of the Proposed Scheme. For residents of Critchley House and Hey Brook Farm, views of the Proposed Scheme will be largely screened by intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **medium** magnitude of visual change. The **medium** magnitude of visual change and **high** sensitivity will result in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 15 and year 30 – summer: Effects will reduce to non-significant in year 15 and remain so for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south-west from Footpath Golborne 27/10 (High sensitivity receptors) (VP 327-03-008)	
Year 1 – winter and summer: Footpath users and residents of The Old Shippen, Lightshaw Barn and Lightshaw Hall (Grade II*) of **high** susceptibility and with **medium** value views, will experience a substantial change to near-distance views. Lowton North embankment and Lightshaw Lane telecommunications site will be new, large-scale structures introduced into views of the low-lying rural landscape of Lightshaw Meadows. Lowton North embankment and Lightshaw Lane telecommunications site will be visible in the context of the WCML, although the Proposed Scheme will be closer	Level of effect: **Major** adverse (significant)

View south-west from Footpath Golborne 27/10 (High sensitivity receptors) (VP 327-03-008)	
within views and at a greater scale than the existing rail infrastructure. The Proposed Scheme on Lowton North embankment will foreshorten near-distance views for these receptors and will feature prominently on the skyline across the majority of the view. There will be near-distance views of boundary fencing, overhead line equipment and train movements along the top of Lowton North embankment with some views partially filtered through intervening garden vegetation. Footpath Golborne 27/10 will have been permanently diverted and footpath users will have sequential and largely oblique views of the Proposed Scheme. There will be near-distance views of the Proposed Scheme for users of Footpath Golborne 27/10 as they pass through Footpath Golborne 27/10 underbridge and Windy Bank culvert. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	
Year 15 – summer: Maturing mitigation planting will partially filter views of the lower slopes of Lowton North embankment and the associated boundary fencing. However, Lowton North embankment will continue to foreshorten views to the west and feature prominently on the skyline. Overhead line equipment and train movements will remain visible above the line of mitigation planting. Users of the diverted Footpath Golborne 27/10 will have near-distance views of the Proposed Scheme from the diverted Footpath Golborne 27/10 as it passes through Footpath Golborne 27/10 underbridge and Windy Bank culvert. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: Effects will reduce to non-significant by for year 30 due to the growth and maturity of the mitigation planting (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south from Footpath Ashton-in-Makerfield 25/20 (High sensitivity receptors) (VP 327-02-006)	
Year 1 – winter and summer: Residents of Aye Bridge Farm, Balmer's Farm and footpath users of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Lowton North embankment will be a new, large-scale element introduced into views of the low lying the Hey Brook corridor. Although viewed in the context of WCML, the Proposed Scheme will be much closer within the view and at a much greater height than WCML. The Proposed Scheme on Lowton North embankment will feature prominently on the skyline across a large proportion of the view for residents in this location. Train movements and overhead line equipment will be visible across the top of Lowton North embankment against the skyline. Realigned A573 Wigan Road will have brought traffic movements and roadside lighting further west within the view and into a previously unlit area within the Hey Brook corridor. There will be near-distance views of the Proposed Scheme for residents of Aye Bridge Farm and Balmer's Farm, with some views screened by intervening buildings and partially filtered through intervening vegetation. The loss of vegetation during construction will substantially change the composition of views and will open up views of the Proposed Scheme. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south from Footpath Ashton-in-Makerfield 25/20 (High sensitivity receptors) (VP 327-02-006)	
Year 15 – summer: Maturing mitigation planting will partially filter views of the Proposed Scheme. However, the Proposed Scheme on Lowton North embankment will continue to feature prominently on the skyline across a large proportion of the view, with overhead line equipment and train movements visible along the top of Lowton North embankment above the treeline. Views of realigned A573 Wigan Road from Aye Bridge Farm will be largely screened by intervening buildings and partially filtered through intervening vegetation. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will further filter views of the Proposed Scheme. However, Lowton North embankment will continue to feature prominently on the skyline across a large proportion of the view. Train movements and overhead line equipment will be visible along the top of Lowton North embankment in the middle distance. The magnitude of visual change will remain **medium** and effects will remain **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)
Night-time effects – year 1 Realigned A573 Wigan Road will have brought traffic movements and roadside lighting further west within the view compared to the baseline and will be a new area of illumination in the middle distance, within views of a largely unlit area of the Hey Brook corridor. The lights will be designed to reduce the visual impact of the lighting installation. At night there will be a **medium** magnitude of visual change and a **moderate** adverse effect (significant).	Level of effect: **Moderate** adverse (significant)
Night-time effects year 15 and 30 Effects will reduce to non-significant in years 15 and 30 due to the growth and maturity of mitigation planting. This will screen the majority of the lighting arising from the Proposed Scheme (reported in detail in Volume 5: Appendix LV-001-0MA05).	Level of effect: Non-significant

View south-west from the A573 Wigan Road (High sensitivity receptors) (VP 328-03-001)	
Year 1 – winter and summer: Visitors to the Leeds and Liverpool Canal and residents on the edge of Dover of **high** susceptibility and road users of lower susceptibility, all with **medium** value views, will experience a substantial change to middle-distance views. Lowton North embankment, Aye Bridge embankment, Abram embankment, realigned A573 Wigan Road and overbridge, Hey Brook offline overbridge and WCML box structure, will be new, large-scale elements introduced into views of the low-lying Hey Brook corridor and Abram Flashes SSSI. Although the Proposed Scheme will be viewed in the context of the WCML, the Proposed Scheme will be at a greater scale than the existing rail infrastructure and will be visible across the majority of the view. Realigned A573 Wigan Road will be elevated within the view and will be more urban in character with upgraded roadside lighting and the addition of roadside barriers. Open views across the Hey Brook corridor and Abram Flashes SSSI from the Leeds and Liverpool Canal will be replaced by views of realigned road, roadside barriers, signage, lighting columns and vehicle movements. However, the majority of views from the Leeds and Liverpool Canal will be filtered through intervening canal side vegetation. Views of Aye Bridge Farm will be obscured by realigned A573 Wigan Road which will be on embankment. For road users travelling along realigned A573 Wigan Road, views will be re-orientated in a north/south direction and elevated views across the Hey Brook corridor will become available as motorists travel along realigned A573 Wigan Road. However, the Proposed Scheme will be visible to motorists across the majority of the view. For residents of Dover, the majority of views will be screened by landform and filtered through intervening vegetation and screened by	Level of effect: **Major** adverse (significant)

View south-west from the A573 Wigan Road (High sensitivity receptors) (VP 328-03-001)	
intervening buildings. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect. A photomontage illustrating this scenario is included Volume 5: Appendix LV-001-0MA05.	
Year 15 – summer: Maturing mitigation planting will partially filter views of the lower slopes of realigned A573 Wigan Road on embankment. However, views across the rural landscape of the Hey Brook corridor for visitors to the Leeds and Liverpool Canal, will continue to be foreshortened by the presence of realigned A573 Wigan Road on embankment. Road users travelling along realigned A573 Wigan Road will continue to have elevated views across the Hey Brook corridor towards the Proposed Scheme with some views partially filtered through maturing mitigation planting. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect. A photomontage illustrating this scenario is included Volume 5: Appendix LV-001-0MA05.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of mitigation planting will further filter views of the Proposed Scheme for visitors to the Leeds and Liverpool Canal and road users along realigned A573 Wigan Road. However, views across the rural landscape of the Hey Brook corridor from the Leeds and Liverpool Canal will continue to be foreshortened by the elevated A573 Wigan Road. The magnitude of visual change will remain **medium** and effects will be **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)

View south-west from Footpath Ashton-in-Makerfield 22/30 (High sensitivity receptors) (VP 328-03-003)	
Year 1 – winter and summer: Footpath users and visitors to Viridor Wood of **high** susceptibility and with **medium** value views, will experience a substantial change to near and middle-distance views. Lowton North embankment, Aye Bridge embankment, Abram embankment and retaining walls, realigned A573 Wigan Road and viaducts, Hey Brook offline overbridge, WCML box structure and Footpath Ashton in Makerfield 22/30 accommodation underbridge will be new large-scale structures. These new elements will be introduced into views across the low-lying landscape of the Hey Brook corridor and Abram Flashes SSSI. Although the Proposed Scheme will be viewed in the context of the WCML, the Proposed Scheme will be much larger than the existing WCML rail infrastructure and will be visible across the majority of the view. Realigned A573 Wigan Road will cut across the river valley landscape, and open views across the Hey Brook corridor and Abram Flashes SSSI will be interrupted by the presence of realigned A573 Wigan Road, signage, lighting columns and vehicle movements. The loss of intervening vegetation and woodland at Viridor Wood during construction will noticeably change the composition of views and will open up views of the Proposed Scheme in operation. Footpath Ashton-in-Makerfield 22/30 will have been permanently realigned and there will be near-distance views for footpath users as they travel through Footpath Ashton-in-Makerfield 22/30 accommodation underbridge. Mitigation planting will not be sufficiently established to assist in filtering views or the visual integration of the Proposed Scheme into its landscape context. The combination of above will result in a **high** magnitude of visual change. The **high** magnitude of visual change and **high** sensitivity will result in a **major** adverse significant effect.	Level of effect: **Major** adverse (significant)

View south-west from Footpath Ashton-in-Makerfield 22/30 (High sensitivity receptors) (VP 328-03-003)	
Year 15 – summer: Maturing mitigation planting will partially filter views of realigned A573 Wigan Road and the lower slopes of Lowton North embankment. Mitigation planting will also assist in the integration of the Proposed Scheme into views of the Hey Brook corridor and Abram Flashes SSSI. However, realigned A573 Wigan Road will continue to be visible in wider views of the Hey Brook corridor. The magnitude of visual change will reduce to **medium** resulting in a **moderate** adverse significant effect.	Level of effect: **Moderate** adverse (significant)
Year 30 – summer: The greater maturity of the mitigation planting will continue to filter views of the Proposed Scheme. However, realigned A573 Wigan Road will remain prominent in views across the Hey Brook corridor and Abram Flashes SSSI. The magnitude of visual change will remain **medium** and effects will remain **moderate** adverse (significant).	Level of effect: **Moderate** adverse (significant)

Other mitigation measures

11.5.10 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.

Summary of likely residual significant effects

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

- moderate adverse effects in relation to one LCA;
- major adverse visual effects at one representative residential viewpoint location;
- moderate adverse visual effects at eight representative residential viewpoint locations; and
- moderate adverse visual effects at seven representative recreational viewpoint locations.

Cumulative effects

Cumulative landscape effects

11.5.12 No significant cumulative temporary effects during operation are anticipated.

Cumulative visual effects

11.5.13 No significant cumulative temporary effects during operation are anticipated.

Monitoring

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

11.5.15 There are no area-specific requirements for monitoring landscape and visual mitigation during the operation of the Proposed Scheme in the Risley to Bamfurlong area.

12 Socio-economics

12.1 Introduction

12.1.1 This section reports on the environmental baseline, likely economic and employment impacts as well as significant effects during construction and operation of the Proposed Scheme within the Risley to Bamfurlong area. The assessment considers existing businesses, community organisations, local employment and local economies, including planned growth and development.

12.1.2 Engagement with Warrington Borough Council (WBC), Wigan Metropolitan Borough Council (WMBC) and Greater Manchester Combined Authority (GMCA) 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.

12.1.3 The socio-economic effects on employment at a route-wide level are reported in Volume 3, Section 12. Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2, MA05 Map Book. The Proposed Scheme is described in Section 2.

12.2 Scope, assumptions and limitations

12.2.1 The scope, assumptions and limitations for the socio-economics assessment are set out in Volume 1 (Section 8) and the EIA Scope and Methodology Report (SMR)[99]. The assessment of in-combination effects draws upon the findings of other technical disciplines (e.g. air quality, sound, noise and vibration, landscape and visual and traffic and transport).

12.2.2 It is assumed that existing business resources can be retained within areas of land required for some utility works including the raising or lowering of pylons, the re-stringing of cables, utility decommissioning or the provision of access routes to such works. On the basis of this assumption, no direct assessment has been undertaken in relation to the following business resources:

- Everest Ltd, Go 2 Telecom and Moorgate Ltd in Taylor Business Park;
- Cheshire Telecoms, Spa Beautiful UK Ltd, Ensphere and Taylor Estates Ltd at the Taylor Estate; and
- Keyline Builders Merchants and East Lancs Motor Company on Pocket Nook Lane, Lowton.

[99] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

12.3 Environmental baseline

Existing baseline

Study area description

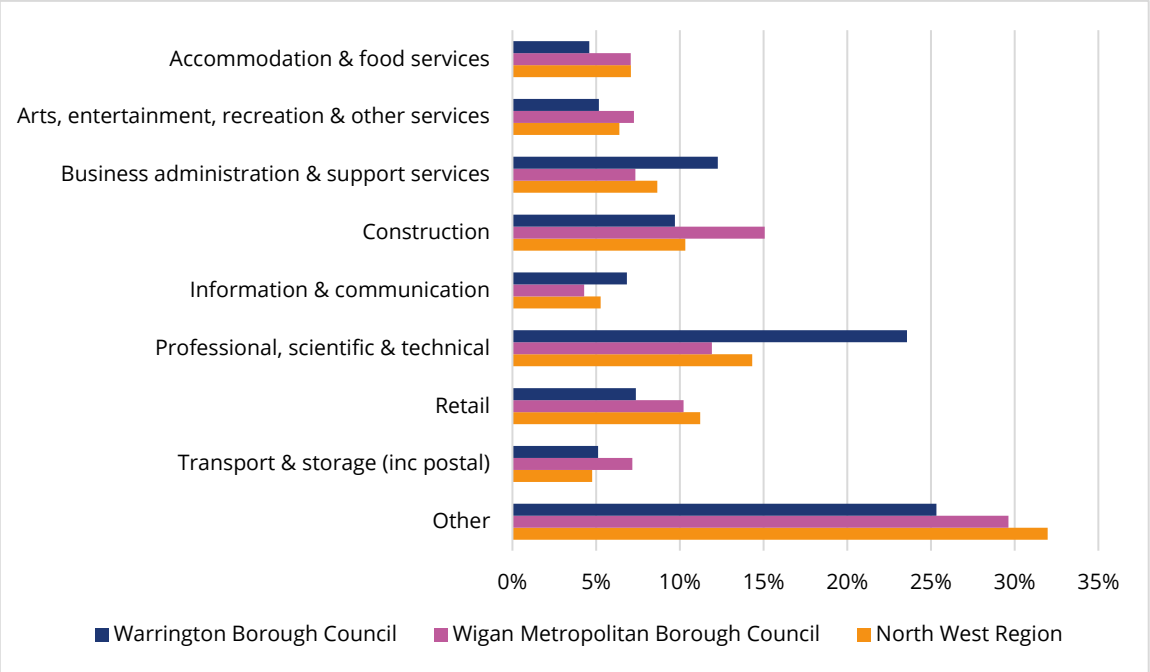
12.3.1 The following provides a brief overview of employment, economic structure, labour market and business premises availability within the Risley to Bamfurlong area which lies within the administrative areas of WBC and WMBC and within the North West region. The southern section of the study area falls within the Cheshire and Warrington Local Enterprise Partnership (LEP) area and the northern section of the study area falls within the Greater Manchester LEP area and the GMCA area.

Business and labour market

12.3.2 Within the WBC and WMBC administrative areas there is a wide spread of business types reflecting a diverse range of commercial activities. In the WBC area in 2020 the professional, scientific and technical sector accounted for the largest proportion of businesses (24%), with business administration and support services the second largest (12%), followed by construction (10%) and retail (7%). In the WMBC area in 2020 the construction sector accounted for the largest proportion of businesses (15%), with professional, scientific and technical the second largest (12%), followed by retail (10%) and business administration and support services (7%), as shown in Figure 10. For comparison within the North West region, the largest sectors were professional, scientific and technical (14%) and retail (11%), followed by construction (10%) and business administration and support services (9%)[100].

[100] Office for National Statistics (2020), *UK Business Counts - Local units by industry and employment size band.* Available online at: https://www.nomisweb.co.uk/datasets/idbrlu.

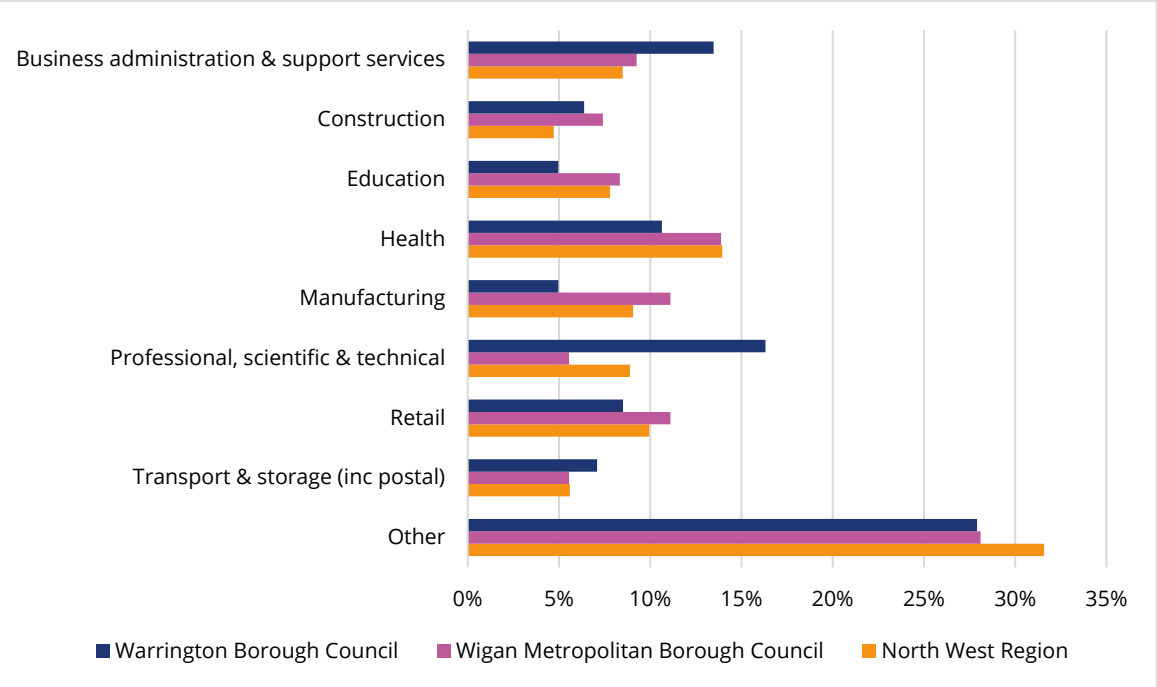
Figure 10: Business sector composition in the Warrington Borough Council and Wigan Metropolitan Borough Council areas and the North West region



12.3.3 In 2019[101], approximately 141,000 people worked in the WBC area. According to the Office for National Statistics Business Register and Employment Survey 2019, the top four sectors in terms of share of employment in the WBC area were: professional, scientific and technical (16%); business administration and support services (13%); health (11%); and retail (9%). Approximately 108,000 people worked in the WMBC area. The top four sectors in terms of share of employment in the WMBC area were: health (14%); manufacturing (11%); retail (11%); and business administration and support services (9%). These compare with the top four sectors for the North West region, which were: health (14%); retail (10%); manufacturing (9%); and professional, scientific and technical (9%), as shown in Figure 11.

[101] Office for National Statistics (2019), *Business Register and Employment Survey*. Available online at: http://www.nomisweb.co.uk/datasets/newbres6pub. This number includes both residents and non-residents of WBC and WMBC who work within their boundaries.

Figure 11: Employment by industrial sector in the Warrington Borough Council and Wigan Metropolitan Borough Council areas and the North West region



12.3.4 According to the Annual Population Survey (2020)[102], the employment rate[103] within the WBC area was 80% (103,200 people), and 77% (157,000 people) in the WMBC area. This was higher than that recorded for both the North West region (74%) and for England (76%). In 2020, unemployment in the WBC area was 3.1% and 4.3% in the WMBC area, which compares to the North West region (4.3%) and England (4.8%).

12.3.5 The Annual Population Survey (2020)[104] also shows that 42% of WBC residents and 31% of WMBC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, compared to 39% in the North West region and 43% in England, while 4.7% of WBC residents and 8.9% of WMBC residents had no qualifications, which compares with the North West region (7.5%) and England (6.2%).

Property

12.3.6 A review of the employment land requirement in 2019[105] within the WBC area identified a need for up to 361.7ha of land based on the strategic/local take up model, over the plan

[102] Office for National Statistics (2020), *Annual Population Survey*, NOMIS. Available online at: https://www.nomisweb.co.uk/datasets/apsnew. This number includes the jobs held by residents of WBC and WMBC irrespective of where they work.

[103] The proportion of working age (16-64 year olds) residents that is in employment.

[104] Office for National Statistics (2020), *Annual Population Survey*, NOMIS. Available online at: https://www.nomisweb.co.uk/datasets/apsnew. This number includes the jobs held by residents of WBC and WMBC irrespective of where they work.

[105] BE Group and Mickledore (2019), *Economic Development Needs Assessment Update. Warrington Borough Council.*

period (2017-2037). It was estimated that WBC only had 83.9ha of realistic employment land supply across the borough. The shortfall compared to realistic supply was 277.8ha, equating to an average of 13.9ha per year. The shortfall included both strategic and local sites for logistics or distribution (158.9ha), along with a sizeable office requirement (71ha).

12.3.7 WMBC identified a requirement for approximately 196ha of employment land up to 2026[106]. According to an updated Employment Land Position Statement in 2020[107] approximately 131ha was identified as available[108], which means there was a potential shortfall of around 65ha, across a range of uses including office, industrial and warehousing. Lowton was seen as a popular employment area primarily meeting the needs of sub-regional and local employers and it was one of few employment locations within the borough that had very good access to the strategic road network[109].

12.3.8 Following the decision of Stockport Council on 03 December 2020, Greater Manchester's Plan for Homes, Jobs and the Environment (the Spatial Framework)[110] is no longer being progressed. Although the draft Greater Manchester Spatial Framework (GMSF) is no longer being progressed, the employment land evidence base prepared for that Framework remains valid.

12.3.9 The draft GMSF identified the area around Pocket Nook Lane as an opportunity for substantial housing and employment development.

12.3.10 Based on the latest available data from the Estates Gazette (February 2021), the average vacancy rate for industrial and warehousing property in the WBC and the WMBC areas has been assessed as 22% and 6.8%, respectively), based on marketed space against known stock[111].

12.3.11 Based on the latest available data from the Estates Gazette (February 2021) the average vacancy rate for office space in the WBC and the WMBC areas[112] is 20% and 7.5%, respectively.

[106] Wigan Metropolitan Borough Council (2015), *Wigan Metropolitan Borough Draft Employment Land Review.*

[107] Wigan Metropolitan Borough Council (2019), *Wigan Metropolitan Borough Employment Land Position Statement, October 2020 update*. Available online at: https://www.wigan.gov.uk/Docs/PDF/Council/Strategies-Plans-and-Policies/Employment-Land-Supply-Position-Statement.pdf.

[108] Of the 131ha employment land supply, there is considerable uncertainty about the availability of around 61.59ha.

[109] Wigan Metropolitan Borough Council (2015), *Draft Wigan Allocations and Development Management Local Plan.* Note: on-hold pending substantial progress on the Greater Manchester Spatial Framework.

[110] Greater Manchester Combined Authority (2020), *Greater Manchester's Plan for Homes, Jobs and the Environment: Greater Manchester Spatial Framework Publication Plan 2020*.

[111] Vacant space is based on marketed space identified from Estates Gazette data (EGi) (February 2021).

[112] Based on marketed space identified from Estates Gazette data (EGi) (February 2021).

Future baseline

Construction (2025)

12.3.12 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. The following committed development of relevance to socio-economics that would materially alter the future baseline during construction of the Proposed Scheme in this area, is set out in Table 32.

Table 32: Committed developments of relevance to socio-economics during construction

Map book reference[113]	Planning reference	Description	How this is considered in the assessment
MA05/323	2018/33212	Location: vacant land adjacent to Daten Avenue, Warrington, WA3 6YN. Reserved Matters (Major) - Proposed Reserved Matters approval is sought following Outline 2015/26044 for the development of five no. industrial units (Use Class B2/B8) with associated office space (expected to be occupied as ancillary accommodation but potentially occupied as Use Class B1a office as part of a mixed B1a/B2 and/or B8 development) and works on the application site with landscaping proposals.	Informing future baseline

12.3.13 Implementation of committed development MA05/323 could result in approximately 240 additional jobs, altering the future baseline against which the Proposed Scheme is assessed. As such, this committed development has been included as part of the future baseline and considered within this assessment. The existing composition and numbers of employers, employees and economic sectors in the area is likely to change over time in ways that cannot be accurately forecast.

Operation (2038)

12.3.14 Volume 5: Appendix CT-004-00000 also provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No additional committed developments of relevance for socio-economics have been identified that would materially alter the future baseline in this area.

[113] Volume 5,Planning Data/Committed Development Map Book: Maps CT-13-314b to CT-13-318.

12.4 Effects arising during construction

Avoidance and mitigation measures

12.4.1 The draft Code of Construction Practice (CoCP)[114] includes a range of provisions that will help mitigate socio-economic effects associated with construction within this area, including:

- reducing nuisance through the 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);
- monitoring and managing flood risk and other extreme weather events that may affect socio-economic resources during construction (Section 16);
- 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

Temporary effects

In-combination effects

12.4.2 Businesses within the Risley to Bamfurlong area may experience a number of effects as a result of the construction of the Proposed Scheme, for example, air quality, landscape and visual, noise and vibration or construction traffic impacts. Taken in-combination, these multiple residual effects could amount to a significant change in the ambiance at these businesses leading to a possible loss of trade for the following affected businesses. Durations of in-combination effects have been identified in this Section where information on the duration of contributing effects is provided in the relevant source assessments. The assessment of in-combination effects draws upon: Section 5, Air quality; Section 11, Landscape and visual; Section 13, Sound, noise and vibration; and Section 14, Traffic and transport.

12.4.3 Spa Beautiful, located in Yew Tree Court to the south of Culcheth, will experience significant noise effects for two years and six months and effects from heavy goods vehicle (HGV) construction traffic (congestion and/or delays for road users) as a result of the construction

[114] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

of the Proposed Scheme. The sensitivity of this establishment is assessed to be medium, as customers are considered to be sensitive to impacts on the local environment and setting. The construction works may discourage them from using this facility. Given the duration of effects and the medium level of sensitivity, the Proposed Scheme is assessed to have a significant adverse in-combination effect on this business.

12.4.4 Yew Tree Farm Caravan Club, located south of Culcheth, will experience significant landscape and visual effects and effects from HGV construction traffic (congestion and/or delays for road users) as a result of the construction of the Proposed Scheme. The sensitivity of this establishment is assessed to be medium as customers are considered to be sensitive to impacts on the local environment and setting. The construction works may discourage them from using this facility. Given the duration of effects and the medium level of sensitivity, the Proposed Scheme is assessed to have a significant adverse in-combination effect on this business.

Isolation

12.4.5 No non-agricultural businesses have been identified within the Risley to Bamfurlong area that are expected to experience significant isolation effects as a result of the Proposed Scheme.

Construction employment

12.4.6 There will be one main civil engineering compound (A580 East Lancashire Road main compound), and 11 civil engineering satellite compounds in the Risley to Bamfurlong area. Three of the satellite compounds will continue to be used as railway systems compounds following the completion of civil engineering works. In addition, there will be two further satellite compounds used for railway systems works only.

12.4.7 Up to 6,600 person years of construction employment opportunities will be created at these sites[115], broadly equivalent to 660 full time jobs[116]. Depending on the skill levels required and the skills of local people, these jobs are potentially accessible to residents in the locality and to others living further afield. The impact of the direct construction employment creation has been considered as part of the route-wide assessment (see Volume 3).

12.4.8 Direct construction employment could lead to opportunities for local businesses to supply the Proposed Scheme or to benefit from expenditure of construction workers. The impact of indirect construction employment creation has been considered as part of the route-wide assessment (see Volume 3).

12.4.9 The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3).

[115] 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.

[116] Based on the convention that 10 employment years is equivalent to one full time equivalent job.

Permanent effects

Businesses

12.4.10 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.

12.4.11 Overall, approximately 39 resources in the study area will experience direct impacts as a result of the Proposed Scheme. These are as follows:

- four resources including a birds of prey centre at Taylor Business Park;
- eleven resources at The Warehouse Studios on Glaziers Lane;
- two resources at White's Farm, Wilton Lane;
- approximately 19 resources at Lowton Business Park and Pocket Nook Lane, Lowton;
- two pet care resources on Slag Lane; and
- one resource on Lightshaw Lane.

12.4.12 The resources listed above are those that are anticipated to experience job losses or displacement as a result of the construction of the Proposed Scheme. Additionally, land required for the construction of the Proposed Scheme will directly impact other business resources. These businesses are not listed above, as the effect upon them is not expected to result in job losses or displacement.

12.4.13 Three groups of resources are subject to potentially significant effects on business activities and employment. These resources are listed in Table 33.

Table 33: Resources which will potentially experience significant direct effects

Resource	Description of business activity
The Warehouse Studios, Glaziers Lane	A group of 11 resources including clothing suppliers, a pageant supplier, casting agencies, a knitting store and tearoom, a karate academy and dojo, beauty salons, a web design company, storage for a fishery and other business occupiers.
Resources at Lowton Business Park and Pocket Nook Lane, Lowton	A group of approximately 19 resources including a business supplying components for HGV manufacturing, a printing and hot stamping foil specialist, building materials supplier, logistics company and various occupiers of warehouses and office space within the business park.
Pet care resources on Slag Lane	Two dog care facilities including kennels.

12.4.14 The magnitude of impact focuses on the number of jobs that will 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.

12.4.15 The following factors were taken into account when considering the sensitivity of resources:

- availability of alternative, suitable premises;
- size of the local labour market;
- skill levels and qualifications of local people; and
- levels of unemployment.

12.4.16 Taking account of the sensitivity of the resource and the magnitude of impact, the significance of the resultant effects is set out in Table 34.

Table 34: Significance of effects

Resource	Impact magnitude	Sensitivity	Significance of effect
The Warehouse Studios, Glaziers Lane	High	Medium	Major adverse - significant
Resources at Lowton Business Park and Pocket Nook Lane, Lowton	High	High	Major adverse - significant
Pet care resources on Slag Lane	Medium	Medium	Moderate adverse - significant

12.4.17 The construction of the Proposed Scheme will require the acquisition of land and buildings. An overview of the resources expected to be significantly affected has been included below.

12.4.18 The construction of Culcheth cutting will require the demolition of a range of business premises based at Warehouse Studios, including retailers. The premises host 11 small businesses including onsite car parking. The sensitivity is assessed as medium. Although there is reasonable availability of retail and office space in the area, it is concentrated in town centres which are likely to have higher rental values compared to these premises. The magnitude is high based on the number of jobs located at Warehouse Studios. The effect is assessed to be major adverse and will therefore be significant.

12.4.19 The construction of Lowton cutting and A572 Newton Road overbridge will require the demolition of the business premises at Lowton Business Park and Pocket Nook Lane. The premises comprise a number of offices and industrial premises which are very well connected to the strategic road network. It is expected that office occupiers will be able to relocate more easily than industrial businesses which generally require large sites with good transport connections to the strategic road network. The sensitivity is assessed as high, because relocation might be a challenge for all types of businesses including office occupiers, given the number of businesses in the area that will be looking to relocate at the same time. The magnitude is high based on the number of jobs at the business premises which will be demolished. The effect is assessed to be major adverse and will therefore be significant.

12.4.20 The construction of Slag Lane viaduct and Slag Lane realignment will require the demolition of two business premises on Slag Lane. The premises comprise two dog care facilities including kennels. The sensitivity is assessed as medium due to the land requirements and the specific business requirements. The magnitude is medium based on the number of jobs

at the business premises that will be demolished. The effect is assessed as moderate adverse and will therefore be significant.

12.4.21 Across all of the employment areas reviewed, it is expected that an estimated 270 jobs[117] will either be displaced or possibly lost within the Risley to Bamfurlong area. The impact from the relocation or loss of jobs is considered to be minor in the context of the total number of people employed in the WBC and WMBC areas (approximately 141,000 and 108,000 jobs respectively) and the scale of economic activity and opportunity in the area. There is a reasonable probability that some businesses will be able to relocate to places that will still be accessible to residents within the local area. However, there may be cases where alternative locations are problematic, especially in the Lowton area, and the businesses may be unable to relocate on a like-for-like basis within the area.

Other mitigation measures

12.4.22 Businesses displaced by the Proposed Scheme will 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 will, therefore, offer additional support over and above statutory requirements to facilitate this process[118,119]. Businesses with an interest in land that is either being acquired or possessed temporarily may also be eligible for compensation in accordance with the Compensation Code.

12.4.23 The construction of the Proposed Scheme offers considerable opportunities to businesses and residents along the line of route in terms of supplying goods and services and obtaining employment. HS2 Ltd is committed to working with its suppliers to build a skilled workforce that promotes further economic growth across the UK.

Summary of likely residual significant effects

12.4.24 Likely significant residual effects are shown in Volume 5, Socio-economics Map Book: Maps SE-01-314b to SE-01-318. The Proposed Scheme will require the demolition of a total of over 30 socio-economic resources located at Warehouse Studios, Lowton Business Park and Pocket Nook Lane, and on Slag Lane. The loss of these resources for the construction of the Proposed Scheme will result in adverse residual significant effects.

[117] 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.

[118] High Speed Two Ltd (2022), *Phase 2b Western Leg Information Paper C7: Business relocation*.

[119] High Speed Two Ltd (2022), *Phase 2b Western Leg Information Paper C8: Compensation code for compulsory purchase.*

12.4.25 During construction of the Proposed Scheme customers may also be discouraged from using Spa Beautiful, located in Yew Tree Court to the south of Culcheth, and Yew Tree Farm Caravan Club, as they are expected to be affected by construction works associated with the Proposed Scheme. This will result in adverse residual significant in-combination effects on these two resources.

Cumulative effects

12.4.26 No significant cumulative temporary or permanent effects during construction have been identified.

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

12.5.2 No resources are expected to experience significant direct socio-economic, in-combination or isolation effects during the operation of the Proposed Scheme.

Operational employment

12.5.3 Operational employment will be created at locations along the route including stations, train crew facilities and infrastructure/maintenance depots. These are considered unlikely to be accessed by residents of the area due to their distance from Risley to Bamfurlong area.

12.5.4 Direct operational employment created by the Proposed Scheme could also lead to indirect employment opportunities for local businesses in terms of supplying the project or benefiting from expenditure of directly employed workers on goods and services.

12.5.5 Some of these employment opportunities will be accessible to residents in the locality and, given the transport accessibility within the local area, to residents living further afield.

12.5.6 The impact of operational employment creation has been assessed as part of the route-wide assessment (see Volume 3).

Other mitigation measures

12.5.7 The assessment has concluded that operational effects within the area will be either negligible or beneficial and therefore mitigation is not required.

Summary of likely residual significant effects

12.5.8 There are no significant effects arising during operation.

Cumulative effects

12.5.9 No significant cumulative effects on socio-economic receptors have been identified in the Risley to Bamfurlong area during operation.

Monitoring

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

12.5.11 On the basis of there being no significant residual operational effects, there are no area-specific requirements for monitoring socio-economic effects during the operation of the Proposed Scheme in the Risley to Bamfurlong area.

13 Sound, noise and vibration

13.1 Introduction

13.1.1 This section reports the assessment of the noise and vibration likely significant effects arising from the construction and operation of the Proposed Scheme within the Risley to Bamfurlong area on:

- 'residential receptors': people, primarily where they live, in terms of individual dwellings and on a wider community basis including any shared community open areas; and
- 'non-residential receptors' such as:
  - community facilities including schools, hospitals, places of worship and 'quiet areas'; and
  - commercial properties such as hotels.

13.1.2 'Shared community open areas' are amenity spaces that the Planning Practice Guidance[120] 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.

13.1.3 Non-residential receptors with multiple uses were assessed either based on the most noise sensitive use or were subject to multiple assessments as appropriate.

13.1.4 'Quiet areas' are defined in the EIA Scope and Methodology Report (SMR)[121] as:

- areas designated under Local Plans as being prized for their tranquillity;
- areas designated under Local Plans or Neighbourhood Development Plans as Local Green Spaces; and
- areas identified as Quiet Areas through implementation of the Environmental Noise (England) Regulations[122,123].

[120] Ministry of Housing, Communities and Local Government (2019), *National Planning Practice Guidance – Noise*. Available online at: https://www.gov.uk/guidance/noise--2.

[121] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

[122] *The Environmental Noise (England) Regulations 2006.* Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/uksi/2006/2238.

[123] *The Environmental Noise (England) (Amendment) Regulations 2009* (SI 2009/1610). Available online at: https://www.legislation.gov.uk/uksi/2009/1610.

13.1.5 The methodology for the assessment of likely significant noise and vibration effects was developed in line with Government noise policy[124], planning policy, planning practice guidance on noise[120] and EIA Regulations as described in the SMR.

13.1.6 Engagement has been undertaken with Warrington Borough Council (WBC) and Wigan Metropolitan Borough Council (WMBC) with respect to the sound, noise and vibration assessment. The purpose of this engagement has been twofold. Firstly, engagement has been undertaken on a route-wide basis covering matters including process, scope, method, approach to baseline and mitigation strategy. Secondly, local engagement has been undertaken to obtain relevant information regarding residential and non-residential receptors, existing baseline sound levels and to discuss the development of the mitigation to be included in the Proposed Scheme. Officers from local authorities have been invited to attend and witness baseline sound measurements. Where appropriate, relevant information identified by the authorities has been taken into account in the assessment.

13.1.7 More detailed information regarding the sound, noise and vibration assessment for the Risley to Bamfurlong area is available in the relevant appendices in Volume 5:

- Sound, noise and vibration, route-wide assumptions and methodology (Appendix SV-001-00000);
- Sound, noise and vibration baseline and construction assessment (Appendix SV-002-0MA05); and
- Sound, noise and vibration operation assessment (Appendix SV-003-0MA05).

13.1.8 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2, MA05 Map Book. Mapping to support the sound, noise and vibration assessment is presented in Map Series SV-05 (Volume 2, MA05 Map Book) and Map Series SV-02, SV-03, SV-08 and SV-09 (Volume 5, Sound, noise and vibration Map Book).

13.1.9 The assessment of likely significant effects from noise and vibration on agricultural, community, ecological, health, heritage and socio-economic receptors and the assessment of tranquillity are presented in Section 4, Agriculture, forestry and soils; Section 6, Community; Section 7, Ecology and biodiversity; Section 8, Health; Section 9, Historic environment; Section 12, Socio-economic; and Section 11, Landscape and visual of this report respectively. The Proposed Scheme is described in Section 2.

[124] Department for Environment, Food and Rural Affairs (2010), *Noise Policy Statement for England.* Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf.

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.

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 It is likely that the majority of receptors adjacent to the Proposed Scheme in the Risley to Bamfurlong area are not currently subject to appreciable vibration[125]. The predicted vibration levels at all receptors as a result of the Proposed Scheme has, therefore, been assessed using specific absolute thresholds, below which receptors will not be affected by vibration, rather than vibration change criteria. Further information is provided in Volume 1 (Section 8).

13.3 Environmental baseline

Existing baseline

13.3.1 The Risley to Bamfurlong area is characterised by a mix of small towns, villages, hamlets and isolated residential properties in a predominantly rural setting. The sound environment is generally dominated by local and distant road traffic and local neighbourhood sources, with contributing natural and agricultural sounds.

13.3.2 There are several main roads that contribute to the sound environment near to the Proposed Scheme within the Risley to Bamfurlong area: the M6, the M62 and the interchange between the M6 and M62 at junction 21a of the M6 and junction 10 of the M62; the A580 East Lancashire Road on the south side of Lowton; the A579 Atherleigh Way through Leigh; the A58 Lily Lane and the A573 Wigan Road in the Platt Bridge and Abram area; the A573 Wigan Road through Golborne and Winwick; and the A574 Warrington Road in the north-east area of Warrington. The West Coast Main Line (WCML) passes through Golborne and the Liverpool to Manchester Line (Chat Moss) passes to the north of Culcheth.

[125] Further information is available in the Volume 5: Appendix SV-001-00000, Sound, noise and vibration methodology, assumptions and assessment report and the Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

13.3.3 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.

13.3.4 Further information on the existing baseline, including baseline sound levels and baseline monitoring results, is provided for the Risley to Bamfurlong area in Volume 5: Appendix SV-002-0MA05.

Future baseline

13.3.5 Without the Proposed Scheme, existing sound levels in this area are likely to increase slowly over time. This is primarily due to road traffic growth, which may be as a result of local or national trends or due to specific committed developments. Changes in car technology may offset some of the expected sound level increases due to traffic growth on low speed roads. On higher speed roads, tyre sound dominates and hence the expected growth in traffic is likely to continue to increase ambient sound levels.

13.3.6 The future operational baseline takes account of proposed and likely noise reduction provided in Important Areas identified in Defra's Noise Action Plans for agglomerations[126], roads[127] or railways[128]. Following engagement with Highways England, trunk roads, likely to be resurfaced under future routine maintenance programmes, before the opening of the Proposed Scheme, are assumed to have a low noise surface. Airborne noise levels from railways in Important Areas are assumed to be controlled, where necessary, to the level where there is no Noise Action Plan requirement to investigate further mitigation. Map Series SV-05 (Volume 2, MA05 Map Book) shows any noise Important Areas in the Risley to Bamfurlong area. Further information is reported for the Risley to Bamfurlong area in Volume 5: Appendix SV-002-0MA05.

13.3.7 Committed developments involving sound or vibration sensitive uses within the relevant study area have been included within the assessment and are reported for the Risley to Bamfurlong area in Volume 5: Appendix SV-002-0MA05.

[126] Department for Environment, Food and Rural Affairs (2019), *Noise Action Plan: Agglomerations (Urban Areas)*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/813663/noise-action-plan-2019-agglomerations.pdf.

[127] Department for Environment, Food and Rural Affairs (2019), *Noise Action Plan: Roads (including major roads)*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/813666/noise-action-plan-2019-roads.pdf.

[128] Department for Environment, Food and Rural Affairs (2019), *Noise Action Plan: Railways (including major railways)*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/813664/noise-action-plan-2019-railways.pdf.

Construction (2025)

13.3.8 The assessment of noise from construction activities assumes a future construction baseline year of 2025, which represents the period immediately prior to the start of the construction period. As a reasonable worst case, it has been assumed that no change in baseline sound levels will occur between the existing baseline year of 2018 and the future construction baseline year.

Operation (2038)

13.3.9 The operational assessment is based upon the absolute sound level and/or predicted change in sound levels that will result from operation of the Proposed Scheme. The future operational baseline is the sound environment that would exist in 2038 without the Proposed Scheme. This is presented in Table 1 in Volume 5: Appendix SV-002-0MA05.

13.4 Effects arising during construction

Assumptions and limitations

Local assumptions

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)[129].

13.4.2 Piling and vibratory compaction is likely to result in short-term appreciable ground-borne vibration at a small number of receptors, situated very close to these activities. These receptors will also be exposed to appreciable noise from the construction of the Proposed Scheme. The significance of the identified vibration effects has been assessed in-combination with the airborne noise effects also identified at these receptors. The assessment is presented in Volume 5: Appendix SV-002-0MA05.

13.4.3 Track laying, power system and signalling installation works are unlikely to result in significant construction noise effects, given the short duration close to any communities, and where included in the Proposed Scheme, the presence of the permanent noise fence barriers.

[129] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice.

Avoidance and mitigation measures

13.4.4 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 receptors (including local businesses and quiet areas designated by the local authority);
- 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 2.4m high 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 will 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 will undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data will be provided regularly to, and be reviewed by, the nominated undertaker and made available to the local authorities; and
- contractors will be required to comply with the terms of the CoCP and appropriate action will be taken by the nominated undertaker as required to ensure compliance.

13.4.5 In addition to this mitigation, to avoid or reduce likely community significant effects, taller screening (provided by solid temporary hoarding, temporary stockpiles, screening close to activities or other means to provide equivalent noise reductions), as described in the draft CoCP, has been assumed at the following sites and construction compounds or land required for construction of the Proposed Scheme:

- A580 East Lancashire Road main compound near Lowton;
- along the eastern boundary of land required for construction of Lowton cutting adjacent to Brancaster Drive and Stradbroke Close, Lowton;

- along the western boundary of land required for construction of A572 Newton Road overbridge from Lowton Junior and Infant School to the southern extent of Cedar Avenue, Lowton;
- along the eastern boundary of land required for construction of Lowton cutting adjacent to Newton Gardens, Lowton; and
- along the western boundary of land required for construction of Lowton cutting, from Cabbala Gardens to the A572 Newton Road, Lowton.

13.4.6 Noise insulation will be offered for qualifying buildings as defined in the draft CoCP. Noise insulation or, where appropriate, temporary re-housing will avoid residents being significantly affected by levels of construction noise inside their dwellings. The assessment reported in this section provides an estimate of the buildings that are likely to qualify for noise insulation. None are predicted to qualify for temporary rehousing.

13.4.7 Qualification for noise insulation and, where appropriate, temporary re-housing will be confirmed, as part of seeking prior consent from the local authority under Section 61 of the CoPA. Qualifying buildings will be identified, as required in the draft CoCP, so that noise insulation can be installed, or where appropriate, 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

Residential receptors: direct effects – individual dwellings

13.4.8 Taking account of the avoidance and mitigation measures set out in the previous paragraphs, the following 15 residential properties are forecast to experience noise above the eligibility criteria for noise insulation, but below the eligibility criteria for temporary rehousing, as defined in the HS2 noise insulation and temporary rehousing policy[130]. The locations of these dwellings are indicated on Map Series SV-03 (Volume 5, Sound, noise and vibration Map Book):

- numbers 601, 603, 607 and 608 Warrington Road, Risley (assessment location ref.: 617649);
- two residences at Byrom Hall, Slag Lane, Lowton (assessment location ref.: 617888);
- number 600 and Bates Farm, Warrington Road, Risley (assessment location ref.: 618209); and
- numbers 27, 29, 31, 33, 35, 37 and 39 Lily Lane, Bamfurlong (assessment location ref.: 618261).

[130] Further information is provided in High Speed Two Ltd (2022), *Phase 2b Western Leg Information Paper E13: Control of construction noise and vibration.*

13.4.9 For daytime construction, the threshold for eligibility for noise insulation is 75dB measured outdoors as specified in the draft CoCP.

13.4.10 The mitigation measures, including noise insulation for the 15 residential properties, will reduce noise inside all dwellings such that it does not reach a level where it will significantly affect residents.

Residential receptors: direct effects – communities

13.4.11 The avoidance and mitigation measures to be implemented during construction will reduce airborne construction noise adverse effects on receptors and communities. Residual temporary noise or vibration effects are identified later in this section.

13.4.12 In locations with lower existing sound levels[131], construction noise effects are likely to be caused by changes to noise levels outside dwellings relative to existing sound levels. These may be considered by the local community as an effect on the acoustic character of the area and hence be perceived as a change in the quality of life for that community. These effects are considered to be significant when assessed on a community basis taking account of the local context.

13.4.13 The temporary adverse effects on the residential areas identified in Table 35, including shared open areas, are considered to be significant on a community basis. The duration of impact is the period where the relevant assessment category is exceeded. The predicted monthly construction noise level will vary throughout this period and as a guide the typical and highest monthly noise levels at the closest properties in the community identified are presented in the 'cause' column of this table.

[131] Further information is presented in Volume 5: Appendix SV-001-00000, Sound, noise and vibration methodology, assumptions and assessment.

Table 35: Direct adverse construction effects on residential communities and shared open areas that are considered to be significant on a community basis

Significant effect number (and map reference)[132]	Type of significant effect	Time of day	Location	Cause (construction activities)[133]	Assumed approximate duration of impact
MA05-C-C1 (SV-03- 315)	Construction noise and vibration	Daytime	Risley: approximately 10 dwellings in the vicinity of the A574 Warrington Road.	Overbridge construction. The typical and highest monthly noise levels are approximately 70dB and 80dB.[134] Vibratory rollers associated with site set-up and finishing works are predicted to create a moderate vibration impact at properties near to the Proposed Scheme.	Noise impacts up to five months. Vibration impacts up to one month.
MA05-C-C2 (SV-03- 316)	Construction noise and vibration	Daytime	Wigshaw: approximately 10 dwellings in the vicinity of Wigshaw Lane and Robins Lane.	Overbridge construction and earthworks. The typical and highest monthly noise levels are approximately 55dB to 65dB and 65dB to 75dB[134]. Vibratory rollers associated with site set-up, ground stabilisation and finishing works are predicted to create a moderate vibration impact at properties near to the Proposed Scheme.	Noise impacts up to 11 months. Vibration impacts up to one month.
MA05-C-C3 (SV-03- 316)	Construction noise and vibration	Daytime	Culcheth: approximately 40 dwellings in the vicinity of Crossfield Avenue, Newchurch Lane, Pendle Gardens and Glebeland.	General site works, overbridge construction and pond construction. The typical and highest monthly noise levels are approximately 60dB to 65dB and 70dB to 75dB[134]. Vibratory rollers associated with site set-up, are predicted to create a moderate vibration impact at properties near to the Proposed Scheme.	Noise impacts up to one year and two months. Vibration impacts up to three months.

[132] See MA05 Sound, noise and vibration report, Volume 5: Appendix SV-002-0MA05 and Volume 5, Map Book SV-03.

[133] The construction activity giving rise to the highest predicted noise or vibration level is reported. Multiple construction activities may contribute to the typical noise levels and the approximate duration of impact.

[134] Equivalent continuous sound level at the facade, $L_{pAeq,0700-1900}$.

Significant effect number (and map reference)[132]	Type of significant effect	Time of day	Location	Cause (construction activities)[133]	Assumed approximate duration of impact
MA05-C-C4 (SV-03- 317)	Construction noise and vibration	Daytime	Lowton: approximately 90 dwellings in the vicinity of Brancaster Drive, Hesketh Meadow Lane, A572 Newton Road, Stradbroke Close and Moorfield Crescent.	Pond construction, overbridge construction and earthworks. The typical and highest monthly noise levels are approximately 60dB to 65dB and 70dB to 75dB[134]. Vibratory rollers associated with site set-up and finishing works, are predicted to create a moderate vibration impact at properties near to the Proposed Scheme.	Noise impacts up to one year and eight months. Vibration impacts up to two months.
MA05-C-C5 (SV-03- 317)	Construction noise and vibration	Daytime	Lowton: approximately 10 dwellings in the vicinity of Byrom Lane and Slag Lane.	General site works, underbridge construction and pond construction. The typical and highest monthly noise levels are approximately 60dB to 70dB and 70dB to 80dB[134]. Vibratory rollers associated with site set-up and road embankment works, are predicted to create a moderate vibration impact at properties near to the Proposed Scheme.	Noise impacts up to one year and five months. Vibration impacts up to three months.
MA05-C-C6 (SV-03-318)	Construction noise	Daytime	Bamfurlong: approximately 10 dwellings in the vicinity of Lily Lane.	Highway works. The typical and highest monthly noise levels are approximately 75dB and 85dB[134].	Up to two months.

Residential receptors: indirect effects

13.4.14 Construction traffic is likely to cause adverse noise effects on residential receptors along the A573 Church Street between B5207 Ashton Road and the Heath Street. Approximately 120 dwellings located immediately adjacent to the road are forecast to experience an increase in road traffic noise levels of around 2dB $L_{pAeq,\ 0700\text{-}2300}$ during the peak months, due to additional construction vehicles using this route in an area currently exposed to high levels of sound. This is considered to be a likely significant effect on a community basis at the dwellings on this road, denoted as MA05-C-C7 in Volume 5: Appendix SV-002-0MA05. This temporary adverse effect represents a change in the acoustic character of the area, which may be perceived as a change in the quality of life for that community.

Non-residential receptors: direct effects

13.4.15 The assessment has identified the following non-residential receptors where the predicted airborne noise levels exceed both the relevant screening criteria and the noise change criterion (typically a change of greater than 3dB[135] compared with the existing baseline sound level):

- Yew Tree Court (office), Taylor Business Park, Risley (assessment location reference: 617652);
- The Estate Office, Taylor Business Park, Risley (assessment location reference: 618249);
- Taylor Business Park (lower sensitivity offices), Risley (assessment location reference 618221);
- Newchurch Community Primary School, Culcheth (assessment location reference: 617711);
- Lowton Junior and Infant School, the A572 Newton Road, Lowton (assessment location reference: 617795);
- Lowton Youth and Community Centre, the A572 Newton Road, Lowton (assessment location reference: 617796);
- Gymetc. (lower sensitivity office), the A572 Newton Road, Lowton (assessment location reference: 617798); and
- Green Meadow Independent Primary School and First Steps Day Nursery, Robson Way, Lowton (assessment location reference: 617966).

[135] The exception is where the use and sensitivity of the receptor or land use is very sensitive to noise and have been included in the detailed assessment where there is a change less than 3dB. Further information can be found in Volume 5: Appendix SV-002-0MA05.

13.4.16 The assessment has identified the following non-residential receptors where the predicted airborne noise and vibration levels exceed both the relevant noise and vibration screening criteria and the noise change criterion (typically a change of greater than 3dB compared with the existing baseline sound level):

- The Estate Office, Taylor Business Park, Risley (assessment location reference: 618249); and
- Gymetc. (lower sensitivity office), the A572 Newton Road, Lowton (assessment location reference: 617798).

13.4.17 These locations are identified in the Risley to Bamfurlong area, as shown in Map Series SV-03 (Volume 5, Sound, noise and vibration Map Book). At each of the non-residential receptors identified above an assessment has been undertaken to determine if this impact would result in a significant effect, using the significance criteria set out in Annex A of Volume 5: Appendix SV-001-000.

13.4.18 Yew Tree Court (office) comprises three two-storey buildings, namely, Ensphere House, Yew Tree House and Oakwood House. These buildings are divided into a number of business units. The buildings are closely grouped and are adjacent to the A574 Warrington Road, 16m south of the land required for the construction of A574 Warrington Road overbridge. There is parking to the front and rear of the buildings. There is a lawned area between the car park and A574 Warrington Road, although this does not appear to be laid out as an amenity area. The façade of Ensphere House is a mixture of brick and timber cladding. Yew Tree House and Oakwood House have brick facades. All facades have windows which are assumed to be typical thermal glazing. The buildings are naturally ventilated by opening the windows. It is assumed that the buildings operate normal office hours. Yew Tree Court (office) has been assessed against the offices criteria[136]. Noise levels have been predicted for the façade of the building facing toward the land required for construction of the Proposed Scheme. The predicted daytime monthly construction noise level is above the screening criteria defined in the SMR for office use for a period of two years and six months. The highest predicted daytime monthly construction noise level is 14dB above the screening criteria defined in the SMR. The typical predicted monthly daytime construction noise level is 8dB above the screening criteria defined in the SMR. The change in ambient noise level due to the highest predicted daytime monthly construction is 14dB. On the basis of a precautionary assessment, Yew Tree Court (office) is identified as being subject to a likely significant adverse effect (denoted by MA05-C-N1 in Table 6 Volume 5: Appendix SV-002-0MA05). This temporary adverse effect may take the form of activity disturbance to users of the office.

13.4.19 The Estate Office comprises a single-storey building immediately adjacent to the access road to the Taylor Business Park from the A574 Warrington Road. The building also acts as the security gatehouse for the Taylor Business Park. The Estate Office is immediately adjacent to the land required for the construction of A574 Warrington Road overbridge. The façade of the Estate Office is a mixture of brick at low level with glazing above up to the roof level. All

[136] 55dB $L_{pAeq,0700-2300}$ (free-field) during the day which is equivalent to 58dB $L_{pAeq,0700-2300}$ (façade).

facades have windows which are assumed to be thermal glazing. The building is naturally ventilated by opening the windows. The Estate Office has been assessed against the offices criteria[137]. Noise levels have been predicted for the façade of the building facing toward the land required for construction of the Proposed Scheme. The predicted daytime monthly construction noise level is above the screening criteria defined in the SMR for office use for a period of one year and nine months. The highest predicted daytime monthly construction noise level is 15dB above the screening criteria defined in the SMR. The typical predicted monthly daytime construction noise level is 10dB above the screening criteria defined in the SMR. The change in ambient noise level due to the highest predicted daytime monthly construction is 14dB. On the basis of a precautionary assessment, the Estate Office is identified as being subject to a likely significant adverse effect (denoted by MA05-C-N2 in Table 6 Volume 5: Appendix SV-002-0MA05). This temporary adverse effect may take the form of activity disturbance to users of the office.

13.4.20 The Estate Office has also been assessed for ground-borne vibration against the offices criteria[138]. The typical predicted daytime monthly construction vibration levels at the Estate Office are below the screening criteria defined in the SMR for this use. The highest predicted daytime monthly construction vibration levels at these buildings are above the screening criteria defined in the SMR for this use for a period of up to one month only. The source of vibration impact is the pass-by of vibratory roller, which is likely to be transient in nature. On the basis of these factors, the Estate Office is not considered as being subject to a likely significant adverse effect due to ground-borne vibration.

13.4.21 Taylor Business Park (lower sensitivity offices) comprises a variety of buildings housing industrial and commercial units. The buildings are predominantly single-storey with some larger units of double-storey elevation assumed to include ancillary offices for administrative use associated with the businesses housed within. The business park is set within a rural landscape to the south of Culcheth and is accessed from the A574 Warrington Road via New Hall Lane. The business park is adjacent to the land required for the construction of Culcheth cutting. There are no external amenity areas. Those premises on the business park perimeter facing toward the land required for construction of the Proposed Scheme are generally of brick or lightweight cladding construction. They have limited windows which are assumed to be double thermal glazing. It is assumed that ventilation is a mixture of natural ventilation and mechanical ventilation. The offices at Taylor Business Park have been assessed against the criteria for lower sensitivity offices and have been assessed against BS 5228-1 ABC method, using the screening criteria for baseline noise category A[139]. The predicted daytime monthly construction noise level is above the screening criteria for lower sensitivity offices for two years. The highest predicted daytime monthly construction noise level is 1dB above the screening criteria. The typical predicted monthly daytime construction noise level is below the screening criteria. The exceedance of the screening criteria is

[137] 55dB $L_{pAeq,0700-2300}$ (free-field) during the day which is equivalent to 58dB $L_{pAeq,0700-2300}$ (façade).

[138] A vibration dose value 0.4m/s$^{1.75}$ VDV.

[139] 65dB $L_{pAeq,0700-2300}$ (façade).

marginal, relating only to the highest predicted monthly construction noise level. Furthermore, the context of the buildings is within an industrial estate where there is prevailing industrial activity within units where offices may be situated. On that basis, Taylor Business Park (lower sensitivity offices) is not considered as being subject to a likely significant adverse effect.

13.4.22 Newchurch Community Primary School comprises a single storey building. The school is situated adjacent to the A574 Warrington Road approximately 45m to the north of the land required for the construction of Wigshaw Lane realignment. There is a parking area, play areas, a hard-surfaced multi-use games area (MUGA) and grass playing fields at the school. The façade is a mixture of masonry (brick), light-weight cladding and glazing. The building roofs are assumed to be of a light-weight construction. The building is naturally ventilated by opening windows. There are roof mounted ventilators to some spaces. The building operates school teaching hours between 08:50 and 15:15 on weekdays with morning and afternoon care provision and after-school activities. Newchurch Community Primary School has been assessed against the education facilities criteria[140]. Noise levels have been predicted for the façade of the building facing toward the land required for construction of the Proposed Scheme. The predicted daytime monthly construction noise level is above the screening criteria defined in the SMR for education facilities for a period of two years and five months. The highest predicted daytime monthly construction noise level is 14dB above the screening criteria defined in the SMR. The typical predicted daytime monthly construction noise level is 8dB above the screening criteria defined in the SMR. The highest and typical monthly construction noise levels are above the screening criteria for external amenity spaces defined in the SMR[141]. The change in ambient noise level due to the highest predicted daytime monthly construction is 7dB. On the basis of a precautionary assessment, Newchurch Community Primary School is identified as being subject to a likely significant adverse effect (denoted by MA05-C-N3 in Table 6 Volume 5: Appendix SV-002-0MA05). This temporary adverse effect may take the form of activity disturbance to users of the school.

13.4.23 Lowton Junior and Infant School comprises a single storey building located off the A572 Newton Road approximately 65m to the south-west of the land required for the construction of A572 Newton Road overbridge highway works. There is a parking area, play areas, a hard-surfaced MUGA and grass playing fields at the school. The façade is a mixture of masonry and light-weight cladding and includes double-glazed windows. The building's roof is assumed to be of a light-weight construction. The building is naturally ventilated by opening the windows. There are roof mounted ventilators to some spaces. The building operates school teaching hours between 08:00 and 15:30 weekdays. Lowton Junior and Infant School has been assessed against the education facilities criteria [142]. Noise levels have been predicted for the façade of the building facing toward the land required for construction of the Proposed Scheme. The predicted daytime monthly construction noise level is above the

[140] 50dB $L_{pAeq,0700-2300}$ (free-field) during the day, which is equivalent to 53dB $L_{pAeq,0700-2300}$ (façade).

[141] 55dB $L_{pAeq,0700-2300}$ (free-field) during the day, which is equivalent to 58dB $L_{pAeq,0700-2300}$ (façade).

[142] 50dB $L_{pAeq,0700-2300}$ (free-field) during the day, which is equivalent to 53dB $L_{pAeq,0700-2300}$ (façade).

screening criteria defined in the SMR for education facilities for a period of three years and three months. The highest predicted daytime monthly construction noise level is 11dB above the screening criteria defined in the SMR. The typical predicted daytime monthly construction noise level is 4dB above the screening criteria defined in the SMR. The highest monthly construction noise levels are above the screening criteria for external amenity spaces defined in the SMR[143]. The change in ambient noise level due to the highest predicted daytime monthly construction is 13dB. On the basis of a precautionary assessment, Lowton Junior and Infant School is identified as being subject to a likely significant adverse effect (denoted by MA05-C-N4 in Table 6 Volume 5: Appendix SV-002-0MA05). This temporary adverse effect may take the form of activity disturbance to users of the school.

13.4.24 Lowton Youth and Community Centre comprises a single storey building located off and accessed from the A572 Newton Road approximately 90m to the south-west of the land required for the construction of A572 Newton Road overbridge. Advertised facilities include a community café, judo and martial arts, music recording space, gymnastics and youth club. The club is open Monday to Saturday, 09:00 to 21:00. The building is a mixture of brick and light weight construction. The roof elements are assumed to be of light-weight construction. There are a small number of windows which appear to comprise thermal double glazing. The building is naturally ventilated by opening the windows. Intervening buildings between the centre and the land required for construction of the Proposed Scheme provide some screening. Lowton Youth and Community Centre has been assessed against the small auditoria or halls criteria[144]. Noise levels have been predicted for the façade of the building facing toward the land required for construction of the Proposed Scheme. The predicted daytime monthly construction noise level is above the screening criteria defined in the SMR for small auditoria or halls for a period of six months. The highest predicted daytime monthly construction noise level is 11dB above the screening criteria defined in the SMR. The typical predicted daytime monthly construction noise level is 5dB above the screening criteria defined in the SMR. The highest monthly construction noise levels are above the screening criteria for external amenity spaces defined in the SMR. The change in ambient noise level due to the highest predicted daytime monthly construction is 5dB. On the basis of a precautionary assessment, Lowton Youth and Community Centre is identified as being subject to a likely significant adverse effect (denoted by MA05-C-N5 in Table 6 Volume 5, Appendix SV-002-0MA05). This temporary adverse effect may take the form of activity disturbance to users of the centre.

13.4.25 Gymetc. (lower sensitivity office) comprises a two-storey building located off and accessed from the A572 Newton Road approximately 35m to the south of the land required for the construction of A572 Newton Road overbridge. Facilities include a gym, pool, spa and administration office. The club is open Monday to Thursday (06:30 to 22:00), Friday (06:30 to 20:00) and Saturday and Sunday (09:00 to 19:00). The building is a mixture of brick and lightweight construction. The building is assumed to be ventilated by a mixture of natural

[143] 55dB $L_{pAeq,0700-2300}$ (free-field) during the day, which is equivalent to 58dB $L_{pAeq,0700-2300}$ (façade).

[144] 50dB $L_{pAeq,0700-2300}$ (free-field) during the day which is equivalent to 53dB $L_{pAeq,0700-2300}$ (façade).

and mechanical means. There are opening windows which face the Proposed Scheme. There are no external amenity spaces. The offices at Gymetc. have been assessed against the criteria for lower sensitivity offices and have been assessed against BS 5228-1 ABC method using the screening criteria for baseline noise category B[145]. The predicted daytime monthly construction noise level is above the screening criteria for lower sensitivity offices for one year and seven months. The highest predicted daytime monthly construction noise level is 7dB above the screening criteria. The typical predicted monthly daytime construction noise level is 2dB above the screening criteria. The change in ambient noise level due to the highest predicted daytime monthly construction is 10dB. On the basis of a precautionary assessment, Gymetc. is identified as being subject to a likely significant adverse effect (denoted by MA05-C-N6 in Table 6 Volume 5, Appendix SV-002-0MA05). This temporary adverse effect may take the form of activity disturbance to users of the office.

13.4.26 Gymetc. has also been assessed for ground-borne vibration against the offices criteria[146]. The typical monthly construction vibration levels at this building are below the screening criteria defined in the SMR for this use. The highest predicted daytime monthly construction vibration levels at these buildings are above the screening criteria defined in the SMR for this use for a period of up to one month only. The source of vibration impact is the pass-by of a vibratory roller, which is likely to be transient in nature. On the basis of these factors, Gymetc. is not considered as being subject to a likely significant adverse effect due to ground-borne vibration.

13.4.27 Green Meadow Independent Primary School and First Steps Day Nursery comprises a single storey building located off Robson Way, Lowton approximately 240m to the west of the land required for the construction of Lowton cutting. There is a parking area, play areas, a hard-surfaced MUGA and an artificial sports pitch at the school. The façade is brick masonry with double-glazed windows. The building has tiled pitched roofs. The building is naturally ventilated by opening the windows. The building operates nursery hours (07:15 to 18:30) and school hours (07:15 to 15:45) weekdays. Green Meadow Independent Primary School and First Steps Day Nursery has been assessed against the education facilities criteria [147]. Noise levels have been predicted for the façade of the building facing toward the land required for construction of the Proposed Scheme. The predicted daytime monthly construction noise level is above the screening criteria defined in the SMR for education facilities for a period of one month. The highest predicted daytime monthly construction noise level is 2dB above the screening criteria defined in the SMR. The typical predicted monthly daytime construction noise level is below the screening criteria defined in the SMR. The change in ambient noise level due to the highest predicted daytime monthly construction is 11dB. On the basis that the exceedance of the screening criteria is marginal and of a duration of one month only, Green Meadow Independent Primary School including First Steps Day Nursery is not considered as being subject to a likely significant adverse effect.

[145] 70dB $L_{pAeq,0700-2300}$ (façade).

[146] A vibration dose value 0.4m/s$^{1.75}$ VDV.

[147] 50dB $L_{pAeq,0700-2300}$ (free-field) during the day, which is equivalent to 53dB $L_{pAeq,0700-2300}$ (façade).

Non-residential receptors: indirect effects

13.4.28 The assessment of construction noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in the Risley to Bamfurlong area.

Other mitigation measures

13.4.29 No other mitigation measures are proposed in this area.

Summary of likely residual significant effects

13.4.30 The proposed avoidance and mitigation measures will reduce construction noise inside all individual dwellings from the construction activities such that residents will not be significantly affected[148].

13.4.31 The measures will also reduce the construction noise and vibration effects on the acoustic character in the majority of residential communities. Despite these measures, the noise and vibration effects on the acoustic character in the following local residential community areas are considered likely to be significant:

- Risley;
- Wigshaw;
- Culcheth;
- Lowton; and
- Bamfurlong (noise only).

13.4.32 Construction traffic on the A573 Church Street between B5207 Ashton Road and the Heath Street in this area is likely to cause significant noise effects on adjacent residential properties.

13.4.33 Noise and vibration from specific construction activities has been identified as resulting in significant residual temporary effects on the non-residential buildings at:

- Yew Tree Court, Taylor Business Park, Risley;
- The Estate Office, Taylor Business Park, Risley;
- Newchurch Community Primary School, Culcheth;
- Lowton Junior and Infant School, A572 Newton Road, Lowton;
- Lowton Youth and Community Centre, the A572 Newton Road, Lowton; and
- Gymetc. (lower sensitivity office), the A572 Newton Road, Lowton (assessment location reference: 617798).

[148] Refer to Volume 5: Appendix SV-001-00000.

13.4.34 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 receptors, their use and the benefit of the measures.

Cumulative effects

13.4.35 This assessment has considered the potential cumulative construction noise effects of the Proposed Scheme and other committed developments[149]. It is not anticipated that there will be any significant cumulative noise effects during construction of the Proposed Scheme.

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 the Proposed Scheme is described in Volume 1 (Section 4) and as outlined below for the Risley to Bamfurlong area.

13.5.2 For the purpose of the operation sound, noise and vibration assessment it is assumed that passenger services in this area will start around 05:00. Services will increase to four trains per hour in each direction on the route of the Proposed Scheme[150]. This number of services is generally assumed to operate throughout the day then decrease as trains are stabled with services typically finishing by midnight. The number of trains takes account of HS2 Phase One, Phase 2a and the Proposed Scheme in operation, and other services using HS2 as a result of connections to other conventional lines, including Northern Powerhouse Rail (NPR). The services are assumed to have an operating speed around[151] 155mph (250kph) at the southern end of the Risley to Bamfurlong area progressively decreasing to 105mph (170kph) at the northern end. Further information is presented in Volume 1 (Section 8).

Avoidance and mitigation measures

13.5.3 The development of the Proposed Scheme has sought to reduce noise impact as far as reasonably practicable.

[149] Refer to Volume 5: Appendix CT-004-00000, Planning data/committed development.

[150] The effects of noise and vibration from the operation of the Proposed Scheme are assessed based on the reasonably foreseeable worst case train flows which differ from the train flows described in Section 2. For further information see Volume 1 (Section 8).

[151] Speeds are approximate given the difference in train acceleration/deceleration.

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 UK[152] and European standards[153]. HS2 trains will include reduction of aerodynamic noise from the pantograph that otherwise would occur above 186mph (300kph) with current pantograph designs. The reduction in aerodynamic noise draws on proven technology in use in East Asia. Overall, it is assumed that proven international technology would reduce noise emissions by approximately 3dB at 225mph (360kph) compared to the current minimum UK and European standards.

13.5.6 The Proposed Scheme incorporates noise barriers, in the form of either landscape earthworks and/or noise fence barriers to avoid or reduce significant adverse airborne noise effects. The assessment has been based on the assumption that noise fence barriers are acoustically absorbent on the railway side and are located approximately 5m from the outer rail on surface sections and approximately 3m from the outer rail on viaducts.

13.5.7 In Risley to Bamfurlong area, noise barriers have been incorporated into the Proposed Scheme to avoid or reduce adverse effects due to airborne noise at Lowton.

13.5.8 The envisaged noise barrier locations based upon the currently available information are shown on Map Series SV-05 (Volume 2, MA05 Map Book) and described in Section 2.2.

13.5.9 In other specific locations along the route of the Proposed Scheme, where there are no noise barriers envisaged, noise will be reduced by landscape earthworks provided to avoid or reduce significant visual effects and engineering structures such as cuttings and safety fences on viaducts. The location of the landscape earthworks and relevant engineering structures is shown on Map Series SV-05 (Volume 2, MA05 Map Book).

13.5.10 Significant noise effects from the operational static sources, such as line-side equipment, will be avoided through their design and the specification of noise emission requirements. Further information is presented in Volume 5: Appendix SV-001-00000.

13.5.11 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[154] and the Noise Insulation Regulations 1975[155] ('the NI Regulations').

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[152] Department for Transport (2021), *National Technical Specification Notice (NTSN) Rolling Stock – Noise (NOI).* Available online at: https://www.gov.uk/government/publications/railway-interoperability-national-technical-specification-notices-ntsns.

[153] EU Commission (2014), *Technical Specification for Interoperability (TSI) Noise - Regulation No 1304/2014*.

[154] *The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.*, Her Majesty's Stationery Office, London.

[155] *The Noise Insulation Regulations 1975.* Her Majesty's Stationery Office, London.

Additionally, HS2 Ltd will apply criteria, to provide the same mitigation as defined in 'the NI Regulations' at residential buildings where noise from the use of the Proposed Scheme measured outside a dwelling exceeds the Interim Target defined by the World Health Organization's (WHO) Night Noise Guidelines for Europe[156] or the maximum noise level criteria[157] defined in the SMR. Noise insulation is designed to avoid residents experiencing any residual significant effect on health and quality of life from resulting noise inside their dwelling.

Ground-borne noise and vibration

13.5.12 Significant ground-borne noise or vibration effects from the operational railway will be reduced or avoided through the design of the track and track-bed.

Assessment of impacts and effects

Residential receptors: direct effects – individual dwellings

13.5.13 The avoidance and mitigation measures, set out in the previous section, including noise insulation, will reduce noise inside all dwellings such that it will not reach a level where it will significantly affect residents.

Residential receptors: direct effects – communities

13.5.14 The proposed mitigation measures in the Risley to Bamfurlong area will avoid or reduce adverse effects due to airborne noise on the majority of receptors, and in the following communities:

- Culcheth;
- Wigshaw; and
- Lowton.

13.5.15 Taking account of the envisaged mitigation, Map Series SV-05 (Volume 2, MA05 Map Book) shows the long-term 40dB[158] night-time and the 50dB daytime sound level contours. In general, below these levels adverse effects are not expected.

13.5.16 Above 40dB during the night and 50dB during the day the community effect of noise is dependent on the baseline sound levels in that area and the change in sound level (magnitude of effect) brought about by the Proposed Scheme. The airborne noise impacts and effects forecast for the operation of the Proposed Scheme are presented on Map Series SV-05 (Volume 2, MA05 Map Book). The changes in noise levels shown on these maps are

[156] World Health Organization (2010), *Night Noise Guidelines for Europe*.

[157] Dependent on the number of train passes.

[158] Defined as the equivalent continuous sound level from 23:00 to 07:00 or $L_{pAeq,night}$.

likely to affect the acoustic character of the area such that taking account of the local context[159], there may be a significant effect when assessed on a community basis[160].

13.5.17 Approximately 40 isolated properties within the area have been identified as being subject to a likely adverse noise effect. These effects are likely to be received as an effect on the acoustic character of the area. However, as the affected properties are spatially remote from larger defined residential areas, are subject to smaller magnitudes of noise effect, or are small in number, the effects are not considered to be significant on a community basis.

13.5.18 In this study area, the direct adverse effects on the acoustic character of the areas of the residential communities identified in Table 36 are considered to be significant on a community basis.

Table 36: Direct adverse operational effects on residential communities and shared open areas that are considered to be significant on a community basis

Significant effect number[161] and map reference	Source of significant effect	Time of day	Location and details
MA05-O-C1 (SV-05-316)	Airborne noise increases from new train services and realigned roads.	Daytime and night-time.	Wigshaw Approximately 10 dwellings in the vicinity of Wigshaw Lane and Robins Lane. Forecast increases in sound from the railway and realigned roads are likely to cause a major noise increase affecting the acoustic character of the area around the properties. The effect on the acoustic character of residential areas that are located further from the railway and roads would be moderate or minor adverse. There are no shared open spaces identified as being affected in this community.

Residential receptors: indirect effects

13.5.19 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

Non-residential receptors: direct effects

13.5.20 The assessment has not identified any airborne sound levels greater than the impact screening criteria relevant to the particular building use[162] and typically a change of greater than 3dB[163] compared to the future baseline sound level at any of the non-residential receptors in the Risley to Bamfurlong area.

[159] Further information is provided in Volume 5, Appendices SV-001-00000 and SV-003-0MA05.

[160] Further information is contained in Volume 1.

[161] See Map Series SV-05 (Volume 2, MA05 Map Book).

[162] As defined in the SMR and SV-001-00000.

[163] The exception is where the use and sensitivity of the receptor or land use is very sensitive to noise and have been included in the detailed assessment where there is a change less than 3dB. Further information can be found in Volume 5: Appendix SV-003-0MA05.

13.5.21 The assessment has not identified any ground-borne noise or vibration levels greater than the relevant screening criteria in the Risley to Bamfurlong area.

Non-residential receptors: indirect effects

13.5.22 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

Other mitigation measures

13.5.23 No other mitigation measures are proposed in this area.

Summary of likely residual significant effects

13.5.24 At the majority of individual residences, the proposed mitigation measures will reduce operational noise inside all dwellings such that it does not reach a level where it will significantly affect residents, and therefore, no likely residual significant effects are identified.

13.5.25 At the community level, the envisaged mitigation, including landscape earthworks and noise fence barriers described in this section and presented in Map Series SV-05 (Volume 2: MA05 Map Book), will substantially reduce the potential operational airborne sound impacts and noise effects that would otherwise arise from the Proposed Scheme. Likely residual significant adverse effects due to increased airborne noise levels during operation have been identified at Wigshaw for occupants of residential properties on Wigshaw Lane and Robins Lane identified by MA05-O-C1 on Map SV-05-316.

13.5.26 The assessment of operational noise and vibration indicates that significant direct effects on non-residential receptors are unlikely to occur in this area.

Cumulative effects

13.5.27 It is not anticipated that there will be any significant cumulative noise effects during operation of the Proposed Scheme.

Monitoring

13.5.28 Volume 1 (Section 9) sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

13.5.29 Operational noise and vibration monitoring will 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.

13.5.30 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 will 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 consequential potential significant effects on transport users arising from the construction and operation of the Proposed Scheme through the Risley to Bamfurlong area. The effects on traffic and transport are assessed quantitatively, based on existing baseline traffic conditions and future scenarios.

14.1.2 Engagement with Highways England, Warrington Borough Council (WBC), Wigan Metropolitan Borough Council (WMBC), St Helens Borough Council (SHBC) and Transport for Greater Manchester (TfGM) has been undertaken. An important focus of this engagement has been to obtain relevant baseline information and discuss transport survey requirements and assessment methodology.

14.1.3 A detailed report on traffic and transport impacts within the Risley to Bamfurlong area is contained in the Transport Assessment (see Volume 5: Appendices TR-001, 002, 003 and 005).

14.1.4 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2, MA05 Map Book.

14.1.5 Maps showing traffic and transport significant effects during construction (Map Series TR-03) and operation (Map Series TR-04) and construction HGV routes to compounds (Map Series TR-08) can be found in Volume 5, Traffic and transport Map Book.

14.1.6 In addition, further traffic and transport data are set out in Background Information and Data (BID)[164] (see BID TR-004-00001: Transport Assessment policy and data report).

14.1.7 The Proposed Scheme is described in Section 2.

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)[165].

14.2.2 The peak level of construction traffic activity is expected to be 2030 and the opening year to be 2038. The forecasts used in the assessment have been produced prior to the development of a full understanding of the likely impact of COVID-19 on economic growth

[164] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

[165] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

and travel behaviour. The full impact of COVID-19 is not yet known but is considered likely to result in lower travel demand in the medium term than the forecasts used in the assessment for background traffic and rail, including HS2.

14.2.3 Consequently, the assessment is considered to overstate travel demand for both construction and operation scenarios and therefore to present a robust case for traffic and transport. This also means that the operational assessment for 2046 is likely to include a level of growth more representative of 2048 or later, representing likely impacts at least 10 years post-opening of the Proposed Scheme.

14.2.4 The study area for traffic and transport includes the communities of Warrington (including the suburb of Birchwood), Risley, Croft, Culcheth, Wigshaw, Lowton, Golborne, Pennington (a suburb of Leigh), Ashton-in-Makerfield, Ince-in-Makerfield, Bamfurlong, Abram, Platt Bridge and Wigan, together with the railway stations of Birchwood, Newton-le-Willows, Bryn, Ince, Hindley, Wigan Wallgate and Wigan North Western.

14.2.5 The study area for traffic and transport also includes all strategic and local roads potentially affected by the Proposed Scheme, including the strategic routes: the M6 (including junctions 21a to 25), the M60 (including junctions 13 and 14) and the M62 (including junction 11).

14.2.6 For all roads, the baseline forecast traffic flows for the future years of assessment have been derived using the Department for Transport's (DfT) traffic forecasting tool, Trip End Model Presentation Program (TEMPro). The assessment covers the average weekday morning (08:00-09:00) and evening (17:00-18:00) peak hours.

14.2.7 Forecast future year traffic flows, with and without the Proposed Scheme, have been based on an approach that does not take account of wider effects such as redistribution and reassignment of traffic. This is consistent with the assessment of other phases of HS2. It is not considered that that these wider changes will affect the conclusion of the assessment.

14.2.8 Junction assessments for construction have been undertaken against the peak month of construction traffic and include robust assumptions on the level of construction traffic in the peak hours. The assessments also address the impact of highway interventions. The effects identified are considered to be a reasonable worst case.

14.2.9 Where the effects vary through the construction programme the highest magnitude significant effects are reported. Where there are both adverse and beneficial effects at different times, the highest magnitude adverse and highest magnitude beneficial are both reported.

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, WBC, WMBC, SHBC and TfGM (including

provision of information on public transport, public rights of way (PRoW) and accident[166] data) and desktop analysis.

Surveys

14.3.2 Traffic surveys, comprising junction turning counts, manual classified counts, queue length surveys and automatic traffic counts, were undertaken in June, July and November 2017, and June and July 2018. These data have been supplemented by existing traffic data from other sources, including from Highways England, WMBC, WBC, SHBC and TfGM. Assessment of the data indicates that the weekday peak hours in the area are generally 07:00-08:00 and 16:30-17:30. However, there are only small differences (1% to 3%) between the observed peak hours and the periods 08:00-09:00 and 17:00-18:00, which are the periods when HS2 construction traffic movements and workforce arrivals and departures will have the greatest impact. Consequently, 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 September 2017 to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included PRoW and roads that will be crossed by 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 in this area are the M6, the M60 and the M62. The strategic road network in and around the Risley to Bamfurlong area is generally busy during peak hours and delays can be experienced.

14.3.5 The local roads include (ordered by road class from south to north):

- A574 Birchwood Way/Birchwood Park Avenue/Warrington Road;
- A580 East Lancashire Road;
- A572 Newton Road/Worsley Brow/Worsley Road/Leigh Road;
- A573 Warrington Road/Aye Bridge Road/Wigan Road/Church Street/High Street/Bridge Street/Warrington Road;
- A579 Atherleigh Way;
- A49 Warrington Road/Lodge Lane (also known locally as Roman Road)/Bryn Street;
- A58 Liverpool Road/Gerard Street/Bolton Road/Lily Lane;

[166] The term accident in this report refers to injury related collisions reported to/recorded by the police. This data, known as STATS19, relate only to personal injury accidents on public roads that are reported to the police, and subsequently recorded, using the STATS19 accident reporting form.

- A575 Walkden Road;
- B5212 Holcroft Lane;
- B5207 Wilton Lane/Kenyon Lane/Church Lane;
- B5211 Barton Road;
- B5232 Newearth Road;
- Moss Gate;
- Silver Lane;
- Daten Avenue;
- New Hall Lane;
- Glaziers Lane;
- Wigshaw Lane;
- Kenyon Lane;
- Newton Lane;
- Slag Lane;
- Byrom Lane;
- Higher Green Lane;
- Chaddock Lane;
- Ellenbrook Road; and
- Sandy Lane.

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

14.3.7 Relevant accident data for the road network subject to assessment have been obtained from DfT[167]. Data for the three year period July 2016 to June 2019 have been assessed and any identified clusters (i.e. where there are nine or more accidents in the three year period) have been examined.

14.3.8 Four accident clusters were identified within the Risley to Bamfurlong area:

- M6 junction 23/A580 East Lancashire Road (Haydock Island) – in total there were 10 accidents, of which one was classified as serious and nine were classified as slight;
- A579 Atherleigh Way/Kirkhall Lane – in total there were nine accidents, of which one resulted in a fatality and eight were classified as slight;
- A574 Birchwood Way/B5210 Woolston Grange Avenue/Crab Lane – in total there were 12 accidents, all of which were classified as slight; and
- A580 East Lancashire Road/B5232 Newearth Road/Ellenbrook Road – in total there were 10 accidents, of which one was classified as serious and nine were classified as slight.

[167] Department for Transport (2021), *STATS19 Road Safety Data July 2016 - June 2019*. Available online at: https://www.gov.uk/government/collections/road-accidents-and-safety-statistics.

14.3.9 The route of the Proposed Scheme will cross six roads with roadside footways within the Risley to Bamfurlong area. These are the A573 Wigan Road, Slag Lane, the A572 Newton Road, the B5207 Wilton Lane, Wigshaw Lane and the A574 Warrington Road.

Parking and loading

14.3.10 There is off-street parking within the Risley to Bamfurlong area that may be impacted by the Proposed Scheme. This includes the car park at Gymetc., located off the A572 Newton Road/Pocket Nook Lane, the car park at Lowton Riding Centre, located off Slag Lane, and car parking within Taylor Business Park, located off New Hall Lane.

Public transport network

14.3.11 Thirty-one bus services operate on 17 roads that will be crossed or could be affected by the route of the Proposed Scheme in the Risley to Bamfurlong area. There are also bus stops primarily located to serve the main built-up area. The bus services that could be affected by the Proposed Scheme include:

- A574 Birchwood Park Avenue: route 28 (Warrington - Padgate - Birchwood - Culcheth - Leigh);
- A574 Birchwood Way: route 28 (Warrington - Padgate - Birchwood - Culcheth - Leigh);
- A574 Warrington Road: route 28 (Warrington - Padgate - Birchwood - Culcheth - Leigh); route 28a (Warrington - Culcheth – Leigh); route 281 (Newton-le-Willows - Culcheth High School);
- Wigshaw Lane: route 19 (Warrington - Winwick - Croft - Culcheth - Leigh); service 281 (Newton-le-Willows - Culcheth High School);
- Kenyon Lane: route 281(Newton-le-Willows - Culcheth High School);
- A580 East Lancashire Road: route 281 (Newton-le-Willows - Culcheth High School); route 10 (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Old Road); route 663a (Atherton - St John Rigby College); service 664 (Atherton - Winstanley College);
- B5207 Church Lane: route 590 (Leigh - Pennington - Lowton (Circular)); route 10 (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Old Road); route 10a (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Lane Head); route 34 (Bryn - Leigh - Astley - Worsley - Monton - Pendleton - Manchester); route 34c (Leigh - St Helens); route 663a (Atherton - St John Rigby College); route 664 (Atherton - Winstanley College); route 988 (Hope Academy - Lowton Church);
- A572 Newton Road: route 10 (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Old Road); route 10a (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Lane Head); route 34 (Bryn - Leigh - Astley - Worsley - Monton - Pendleton - Manchester); route 34c (Leigh - St Helens); route 590 (Leigh - Pennington - Lowton (Circular)); route 933 (Lowton - St Mary's High School); route 988 (Hope Academy - Lowton Church); route P6 (Golborne - Priestley College); route 591 (Leigh - Lowton High School); route 281 (Newton-le-Willows - Culcheth High School);

- Slag Lane: route 588 (Leigh - Lowton (Circular)); route 590 (Leigh - Pennington - Lowton (Circular)); route 988 (Hope Academy - Lowton Church); route 591 (Leigh - Lowton High School);
- A573 Bridge Street/High Street/Church Street: route 22a (Warrington - Earlestown - Newton-le-Willows - Wigan); route 360 (Warrington - Newton-le-Willows - Golborne - Abram - Wigan);
- A573 High Street/Church Street: route 10 (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Old Road); route 10a (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Lane Head); route 34 (Bryn - Leigh - Astley - Worsley - Monton - Pendleton - Manchester); route 742 (Platt Bridge - Haydock - Carmel College);
- A573 Ashton Road/Wigan Road/Aye Bridge Road/Warrington Road: route 22a (Warrington - Earlestown - Newton-le-Willows - Wigan); route 360 (Warrington - Newton-le-Willows - Golborne - Abram - Wigan); route 742 (Platt Bridge - Haydock - Carmel College);
- A49 Lodge Lane/Warrington Road: route 320 (St Helens - Ashton-in-Makerfield - Platt Bridge - Wigan);
- A58 Liverpool Road: route 602 (Ashton-in-Makerfield - Earlestown - Newton Community Hospital);
- A58 Bolton Road: route 10 (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Old Road); route 10a (Leigh - Lowton - Golborne - Ashton-in-Makerfield - Wigan via Lane Head); route 34 (Bryn - Leigh - Astley - Worsley - Monton - Pendleton - Manchester); route 559 (Ashton - Hindley - Westhoughton - Bolton);
- A58 Bolton Road/Lily Lane: route 320 (St Helens - Ashton-in-Makerfield - Platt Bridge - Wigan); route 559 (Ashton - Hindley - Westhoughton - Bolton); and
- A58 Lily Lane: route 650 (Hindley Green - St Edmund Arrowsmiths); route 656 (Bickershaw - St Edmund Arrowsmiths via Hindley); route 657 (Ince Bar - St John Rigby College); route 659 (Abram - Bamfurlong (St Edmund Arrowsmith)); route 920 (Bryrchall High School - Hindley Green); route 961 (Winstanley College - Castle Hill); route Y27 (Hindley Green - Byrchall High School); route Y62 (Abram - Cansfield Specialist Language College); route Y64 (Hindley Green - Byrchall High School).

14.3.12 National and local rail services are accessible via Wigan North Western Station and local rail services are accessible via Birchwood, Newton-le-Willows, Bryn, Ince, Hindley, and Wigan Wallgate stations in the Risley to Bamfurlong area. Wigan North Western Station provides access to national services to Liverpool, Manchester, Glasgow, Crewe and Birmingham on the West Coast Main Line (WCML). Newton-le-Willows Station provides access to local services on the Liverpool to Manchester Line (Chat Moss). Bryn Station provides access to local services on the Liverpool to Wigan Line. Ince, Hindley, and Wigan Wallgate stations provide access to local services on the Manchester to Southport Line.

Non-motorised users

14.3.13 There are pedestrian footways adjacent to many of the roads in the built-up areas of Warrington (including the suburb of Birchwood), Risley, Croft, Culcheth, Wigshaw, Golborne, Pennington (a suburb of Leigh), Ashton-in-Makerfield, Ince-in-Makerfield, Bamfurlong, Abram, Platt Bridge and Wigan. Roadside footways vary in width and condition within these areas. Where there is no formal roadside footway provision, non-motorised user numbers are generally low.

14.3.14 In the Risley to Bamfurlong area, National Route 55 (part of the National Cycle Network) passes through the area.

14.3.15 The route of the Proposed Scheme will cross the route of 15 PRoW within the Risley to Bamfurlong area. Further PRoW and roadside footways in the Risley to Bamfurlong area could be affected by the Proposed Scheme and have been included in the assessment.

14.3.16 The surveys undertaken to inform the assessment showed that the routes with the greatest daily usage during the survey day were: Footpath Golborne 33/10, which was used by 204 pedestrians, 30 equestrians and 18 cyclists; and Footpath Croft 108/1, which was used by 148 pedestrians and six cyclists.

Waterways and canals

14.3.17 There is one navigable waterway in the Risley to Bamfurlong area, the Leeds and Liverpool Canal, which is located immediately to the north of Bamfurlong. It is not expected that there will be any effects on the Leeds and Liverpool Canal and it is not considered further in this assessment.

Air transport

14.3.18 There is no relevant air transport in the Risley to Bamfurlong area. Consequently, this topic is not considered further in this assessment.

Future baseline

14.3.19 The future baseline traffic volumes have been calculated for the future years of 2030, 2038 and 2046. These have been used to support the assessment of construction and operation of the Proposed Scheme, reflecting the assumed route-wide construction peak (2030), opening year (2038) and a future assessment year (2046). Growth factors have been checked to ensure that committed developments are appropriately reflected in the growth forecasts. The assumptions underlying committed developments and transport schemes for each assessment year have been discussed with Highways England, WBC, WMBC, SHBC and TfGM and are considered to be appropriately reflected in the traffic forecasts.

14.3.20 It is difficult to forecast how public transport services may change in the future; therefore, unless information on future services is available, it has been assumed that public transport services for the future years of assessment will be the same as those currently operating.

Similarly, pedestrian demand and facilities and parking are assumed to remain unchanged from the base year.

14.3.21 For the Risley to Bamfurlong area, there are no known substantial committed changes to the transport network at the time of the assessment.

Construction

14.3.22 Construction of the Proposed Scheme is expected to commence in 2025 with construction activity continuing to 2038 (although activity in 2038 will be limited to testing and commissioning). Construction activities have been assessed against 2030 baseline traffic flows, irrespective of when they occur during the construction period.

14.3.23 The year 2030 is the common future baseline year and the impact of individual or overlapping activities are considered against this single year.

14.3.24 Future baseline traffic volumes in the peak hours are forecast to grow by an average of 10% by 2030 compared to a baseline year of 2018.

Operation

14.3.25 Future baseline traffic volumes in the peak hours are forecast to grow by an average of 16% by 2038 compared to the baseline year of 2018.

14.3.26 Future baseline traffic volumes in the peak hours are forecast to grow by an average of 23% by 2046 compared to the baseline year of 2018.

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) will be constructed and will be operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
- the majority of roads crossed by the route of the Proposed Scheme will be maintained or locally diverted during construction;
- traffic management measures will be implemented to limit any disruption;
- road closures will be restricted to overnight and weekends, insofar as reasonably practicable;
- temporary alternative routes for roadside footways and PRoW will 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 will 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;

- HGVs will be routed, insofar as reasonably practicable, along the strategic and/or primary road network;
- the use of the local road network will, 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 will be provided, as required, to manage the safe and efficient movement of vehicles on construction HGV routes; and
- on-site welfare facilities will be provided, which will reduce daily travel by site workers.

14.4.2 Section 14 of the draft Code of Construction Practice (CoCP)[168] 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 will 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 will consider the local traffic management strategy including consideration of sensitive receptors, such that adverse impacts will be reduced, insofar as reasonably practicable.

14.4.5 Specific measures include core site operating hours of 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays with site staff and workers generally arriving before the morning peak hour and departing after the evening peak hour. Activities such as major concrete pours may involve extended working hours for reasons of engineering practicability, with very few workers travelling within the peak traffic hours.

14.4.6 The number of private car trips to and from the construction compounds (both workforce and visitors) will be reduced by encouraging alternative sustainable modes of transport or vehicle sharing. This will be supported by an overarching framework travel plan that will require construction workforce travel plans to be produced that will include a range of potential measures to mitigate the impacts of workers' traffic and transport movements associated with construction of the Proposed Scheme. The travel plans will promote the use of sustainable transport modes as appropriate to the location and types of trip. They will include measures such as: provision of information on and promotion of public transport

[168] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

services; provision of good cycle and pedestrian facilities; liaison with public transport operators; promotion of car sharing; and the appointment of a travel plan coordinator to ensure suitable measures are in place and are effective.

14.4.7 Where works potentially affect Network Rail assets, disruption to travelling passengers and freight movements will 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 following section considers the impacts on traffic and transport and the likely consequential significant effects resulting from the construction of the Proposed Scheme.

Key construction transport issues

14.4.9 The assessment takes account of all of the impacts of the Proposed Scheme in the Risley to Bamfurlong area. The main traffic and transport impacts during the construction period within this area will include:

- construction vehicle movements to and from the various construction compounds;
- road closures, realignments and diversions;
- alternative routes for PRoW and roadside footways; and
- possessions on the conventional rail network.

14.4.10 The construction assessment has also considered any impacts in the Risley to Bamfurlong area that arise from construction of the Proposed Scheme in the adjoining community areas.

14.4.11 Construction vehicle movements required to construct the Proposed Scheme will include the delivery of plant and materials, movement of excavated materials and site worker trips. Works will include utility works, earthworks, underpass, viaduct, bridge and highway construction.

14.4.12 Details of the construction compounds are provided in Section 2.3. Table 37 provides details of the compound set up date and the duration of active use. The duration of active use excludes any period where there are no substantial workforce trips or movement of materials to and from the compound.

14.4.13 Table 37 also provides a summary of the HGV and car/light goods vehicle (LGV) access trips at each compound in the peak month of activity and during the busy period. For each compound, the peak month of activity is the month within which HGV traffic is at its highest for that compound. The busy period is the period during which HGV traffic serving that compound will be greater than 50% of the HGV traffic in the peak month. Two-way trips refer to the total number of vehicle movements in both directions (e.g. with 200 westbound vehicles and 100 eastbound, there would be 300 two-way trips). The average daily combined two-way vehicle trips for the busy period is the lower end of the range shown in Table 37 and the average daily combined two-way vehicle trips for the peak month is the upper end of the range shown. The estimated duration of busy period is also provided.

Table 37: Typical vehicle trip generation for construction compounds in the Risley to Bamfurlong area

Compound type	Compound name	Indicative start/set up date (years/ quarter)	Estimated duration of active use (years/ months)	Average daily combined two–way car/LGV trips during busy period and within peak month of activity	Average daily combined two–way HGV trips during busy period and within peak month of activity	Estimated duration of busy period (months)
Satellite	M62 West Viaduct South satellite compound	2027 Q2	4 years and 3 months	244-320	435-502	12
Satellite	M62 West Viaduct North satellite compound	2027 Q4	4 years and 9 months	308-440	454-496	6
Satellite	A574 Warrington Road satellite compound	2027 Q2	3 years and 9 months	175-276	104-142	14
Satellite	Liverpool to Manchester Railway south satellite compound	2027 Q2	2 years and 6 months	191-222	53-76	9
Satellite	Liverpool to Manchester Railway north satellite compound	2027 Q2	3 years and 9 months	178-238	37-46	4
Satellite	B5207 Wilton Lane satellite compound	2027 Q2	4 years	155-218	70-102	6
Satellite	A580 East Lancashire Road satellite compound	2027 Q2	3 years and 3 months	150-184	50-78	4
Main	A580 East Lancashire Road main compound	2027 Q2	4 years and 9 months	262-378	86-110	8

Compound type	Compound name	Indicative start/set up date (years/ quarter)	Estimated duration of active use (years/ months)	Average daily combined two–way car/LGV trips during busy period and within peak month of activity	Average daily combined two–way HGV trips during busy period and within peak month of activity	Estimated duration of busy period (months)
Satellite	A572 Newton Road satellite compound	2027 Q2	3 years and 6 months	163-198	58-72	2
Satellite	Slag Lane satellite compound	2027 Q4	3 years and 9 months	240-334	129-182	9
Satellite	A573 Wigan Road satellite compound	2027 Q2	4 years and 6 months	253-352	358-472	8
Satellite	Bamfurlong satellite compound	2027 Q2	6 years	294-412	125-176	3
Rail Systems	Golborne satellite compound	2029 Q1	2 years and 6 months	122-122	4-4	10
Rail Systems	Winstanley Road satellite compound	2029 Q1	2 years and 6 months	122-122	4-4	10

14.4.14 The locations of the compounds and the associated construction HGV routes are shown in Map Series TR-08 (Volume 5, Traffic and transport Map Book). Table 38 summarises the construction HGV routes to and from each compound to the main road network. For some compounds, Table 38 includes multiple construction HGV routes. This is either because the construction HGV route varies depending on the origin/destination of the trip or because the construction HGV route varies over time to account for changes to the highway network through the construction period.

14.4.15 The average daily combined two-way HGV trips reported in Table 37 represent the total number of HGV movements to and from each compound during the busy period and in the peak month of activity on all of the available construction HGV routes combined. Where multiple construction HGV routes are shown in Table 38, the split of construction traffic between the available construction HGV routes will vary based on the point in the construction programme and the origin/destination of the construction HGV traffic.

Table 38: Construction HGV routes for construction compounds in the Risley to Bamfurlong area

Compound name(s)	Access routes to / from compound(s) to main road network
M62 West Viaduct South satellite compound	• On-site construction traffic route, Silver Lane and M62 junction 11
M62 West Viaduct North satellite compound	• On-site construction traffic route and M62 junction 11
A574 Warrington Road satellite compound	• A574 Warrington Road, Daten Avenue and A574 Birchwood Way • A574 Warrington Road, Birchwood Park Avenue and A574 Birchwood Way

Compound name(s)	Access routes to / from compound(s) to main road network
Liverpool to Manchester Railway south satellite compound	• On-site construction traffic route, Kenyon Lane, B5207 Kenyon Lane, B5207 Church Lane and A580 East Lancashire Road
Liverpool to Manchester Railway north satellite compound B5207 Wilton Lane satellite compound	• B5207 Wilton Lane, B5207 Kenyon Lane, B5207 Church Lane and A580 East Lancashire Road
A580 East Lancashire Road satellite compound A580 East Lancashire Road main compound	• A580 East Lancashire Road
A572 Newton Road satellite compound	• A572 Newton Road and A580 East Lancashire Road
Slag Lane satellite compound	• Slag Lane, B5207 Church Lane and A580 East Lancashire Road • Byrom Lane, Sandy Lane, A572 Newton Road and A580 East Lancashire Road
A573 Wigan Road satellite compound	• A573 Wigan Road/Ashton Road/Church Street/High Street/Bridge Street and A580 East Lancashire Road
Bamfurlong satellite compound	• A58 Lily Lane, A58 Bolton Road and A58 Liverpool Road • A58 Lily Lane, A58 Bolton Road and A49 Warrington Road • A58 Lily Lane, A573 Warrington Road/Wigan Road/Ashton Road/Church Street/High Street/Bridge Street and A580 East Lancashire Road
Golborne satellite compound	• A573 Wigan Road/Ashton Road/Church Street/High Street/Bridge Street and A580 East Lancashire Road
Winstanley Road satellite compound	• Winstanley Road, A58 Lily Lane, A58 Bolton Road and A58 Liverpool Road • Winstanley Road, A58 Lily Lane, A58 Bolton Road and A49 Warrington Road • Winstanley Road, A58 Lily Lane, A573 Warrington Road/Wigan Road/Ashton Road/Church Street/High Street/Bridge Street and A580 East Lancashire Road

14.4.16 Information on the indicative construction programme is provided in Section 2.3 and the construction methodology is summarised in Volume 1 (Section 6). This illustrates how the phasing of activities at different compounds will generally be staggered and that construction activities at individual compounds may not occur over the whole duration presented in Table 37.

14.4.17 The assessment of the effects of construction of the Proposed Scheme on the highway network in the Risley to Bamfurlong area is based on the highest volume of construction traffic on each construction HGV route during the construction period. Where construction HGV routes will serve more than one construction compound, the assessment is based on the highest combined volume of construction traffic on each section of each construction HGV route during the construction period.

Highway network

Strategic and local highway network

14.4.18 The primary HGV access routes for construction vehicles will be the strategic and/or primary road network with the use of the local road network limited, so far as reasonably practicable. The construction HGV routes will also provide access to compounds. Where reasonably practicable, site haul routes alongside the route of the Proposed Scheme will be used to reduce the impact on the local road network. In this area, the main construction HGV routes will be (ordered by road class from south to north):

- A574 Birchwood Way/Birchwood Park Avenue/Warrington Road (between the M62 junction 11 and Newchurch Lane);
- A580 East Lancashire Road (between the M60 junction 14 and the M6 junction 23);
- A572 Newton Road (between the B5207 Kenyon Lane and Sandy Lane);
- A573 Bridge Street/ High Street/Church Street/Ashton Road/Wigan Road/Warrington Road/Aye Bridge Road (between the A580 East Lancashire Road and the A58 Lily Lane);
- A49 Warrington Road/Lodge Lane (also known locally as Roman Road) (between the M6 junction 23 and the A58 Liverpool Road);
- A58 Liverpool Road/Gerard Street/Bolton Road/Lily Lane (between the M6 junction 24 and the A573 Warrington Road);
- B5212 Holcroft Lane (southern section);
- B5207 Wilton Lane/Kenyon Lane/Church Lane (between Church Farm and Slag Lane);
- Daten Avenue;
- New Hall Lane;
- Glaziers Lane;
- Wigshaw Lane (between Lady Lane and Glaziers Lane);
- Kenyon Lane (between Wilton Grange and the B5207 Wilton Lane);
- Slag Lane (between the B5207 Church Lane and Byrom Lane);
- Sandy Lane; and
- Byrom Lane.

14.4.19 In addition to increases in traffic flows due to construction traffic, temporary highway closures and diversions or realignments will be required in a number of locations as set out in Section 2.3. The works to construct both temporary and permanent highway diversions/realignments could also result in disruption to highway users. In most cases, these works will be restricted to short-term overnight and/or weekend closures, and are not, therefore, considered significant. The following works will have a longer duration:

- M62 – traffic management will be required during the construction of M62 West viaduct for a period of two years, comprising the narrowing of the existing traffic lanes on the M62 between junction 11 and junction 12 to achieve enough working space and an access route for construction traffic. One of the Smart Motorway 'all running' lanes will be

temporarily closed in each direction, with three 'live' traffic lanes retained in the eastbound and westbound directions. In order to construct the viaduct over the M62, six temporary full closures of the motorway (two off peak weekend closures and four shorter off-peak or night-time closures), will be required between junction 11 and junction 12 over a period of two months. During these short duration closures, traffic will be diverted via the M6, the M56, the A5103 Princess Parkway and the M60, increasing journey length for some users by 28.5km;

- New Hall Lane and A574 Warrington Road – the permanent New Hall Lane diversion and the A574 Warrington Road realignment will be constructed in phases. The initial phase will comprise the construction of the northern section of the A574 Warrington Road realignment. During this period, all traffic to and from Taylor Business Park will be required to use New Hall Lane (southern access), which will be permanently modified to facilitate two-way traffic. Following the completion of the northern section of the A574 Warrington Road and modification of the northern access to Taylor Business Park, all traffic will be temporarily diverted along the A574 Warrington Road realignment in order to connect with the existing A574 Warrington Road to the north of the business park. The temporary diversion will be in use for two years, increasing journey length for some users by 432m. New Hall Lane (southern access) will then be permanently closed and the southern section of the A574 Warrington Road realignment will be completed;
- A580 East Lancashire Road – temporary realignment of a 1km section of the A580 East Lancashire Road, 80m to the south of the existing alignment, to enable the construction of A580 East Lancashire Road overbridge. The temporary realignment will be in use for two years and six months, resulting in a negligible change in journey length;
- A572 Newton Road – temporary realignment of a 400m section of the A572 Newton Road, 20m to the south-east of the existing alignment, to enable the construction of A572 Newton Road overbridge. The temporary realignment will be in use for two years, resulting in a negligible change in journey length. On completion of construction, the road will be permanently reinstated along its existing alignment;
- Slag Lane – Slag Lane will remain open with temporary traffic management measures during the construction of the permanent realignment of Slag Lane, to be constructed offline. This will take three years to complete and will not result in an increase in journey length. During this period, temporary road restrictions and traffic management measures will be implemented for two months to enable connection between the realigned section and the existing road; and
- A573 Wigan Road – temporary traffic management measures on the A573 Wigan Road during construction of the A573 Wigan Road realignment. This will take three years and three months to complete and will not result in an increase in journey length. On completion of the A573 Wigan Road realignment construction, traffic management measures will be implemented for three months to enable connection between the realigned section of road and the existing road.

14.4.20 The temporary diversions or realignments will change journey length for vehicle occupants. Many of the diversions or realignments are less than 1km in length and will not result in any significant effects with regard to changes to journey times for vehicle occupants.

14.4.21 The temporary full closures of the M62 between junction 11 and junction 12 will result in a diversion of up to 28.5km and will lead to changes to journey length for highway users. However, given the durations of the closures, these will not result in any significant effects with regard to increased journey times for vehicle occupants.

14.4.22 During weekend and overnight closures associated with the realignment of a section of the M62, the main increases in traffic flows will occur on roads used as temporary diversion routes. However, this will not have a significant effect on congestion and delays on the diversion routes because the underlying baseline traffic flows at these times are lower than the daytime flows on a weekday.

14.4.23 The movement of excavated or fill material and construction vehicles accessing construction compounds during the construction of the Proposed Scheme together with temporary road closures and diversions is expected to result in changes in daily traffic flows.

14.4.24 Utility works have been included in the assessment where they are major and where the traffic or transport impacts from the works separately, or in combination with other works, will be greater than other construction activities arising within the area. Most utility works are expected to result in only localised traffic and pedestrian diversions, which will be of short-term duration and are not expected to result in significant effects.

14.4.25 These changes in traffic flow will lead to changes in delays to vehicle occupants and congestion, which are significant. The significant effects with the highest magnitude at each junction will be (ordered by road class from south to north):

- M6 junction 23/A580 East Lancashire Road (Haydock Island) - major adverse effect;
- A574 Birchwood Way/A574 Birchwood Park Avenue/Oakwood Gate (George Duckworth Roundabout) - major adverse effect;
- A574 Birchwood Way/Moss Gate/Daten Avenue - minor adverse effect;
- A574 Warrington Road/A574 Birchwood Park Avenue/Daten Avenue/Warrington Road - minor adverse effect;
- A574 Warrington Road/Cross Lane/Silver Lane - major adverse effect;
- A574 Warrington Road/Glaziers Lane - major adverse effect;
- A574 Warrington Road/B5207 Common Lane - major adverse effect;
- A572 Newton Road/B5207 Church Lane/B5207 Kenyon Lane - major adverse effect;
- A580 East Lancashire Road/Stone Cross Lane South/Stone Cross Lane North - major adverse effect;
- A580 East Lancashire Road/B5207 Church Lane - major adverse effect;
- A580 East Lancashire Road/A572 Newton Road - major adverse effect;
- A580 East Lancashire Road/A573 Warrington Road - major adverse effect;

- A580 East Lancashire Road/Sandy Lane - minor adverse effect;
- A580 East Lancashire Road/A579 Atherleigh Way - major adverse effect;
- A573 High Street/Heath Street - major adverse effect;
- A580 East Lancashire Road/A574 Warrington Road - major adverse effect;
- A573 Ashton Road/A573 Church Street/B5207 Lowton Road - major adverse effect;
- A573 Wigan Road/A573 Ashton Road/B5207 Ashton Road - major adverse effect;
- A58 Liverpool Road/A58 Gerard Street/A49 Warrington Road/A49 Bryn Street - major adverse effect;
- A58 Gerard Street/A58 Bolton Road/A5062 Wigan Road/Princess Road - major adverse effect;
- A58 Bolton Road/B5207 Golborne Road - major adverse effect;
- A580 East Lancashire Road/Higher Green Lane - major adverse effect;
- A580 East Lancashire Road/A572 Chaddock Lane - major adverse effect;
- A580 East Lancashire Road/A577 Mosley Common Road - major adverse effect;
- A580 East Lancashire Road/B5232 Newearth Road/Ellenbrook Road - major adverse effect;
- A580 East Lancashire Road/A575 Walkden Road - major adverse effect;
- A58 Warrington Road/A573 Warrington Road/A58 Lily Lane/B5237 Bickershaw Lane/Powell Street - major adverse effect; and
- B5207 Church Lane/B5207 Golborne Road/Stone Cross Lane/Slag lane - major adverse effect.

14.4.26 Construction of the Proposed Scheme will result in substantial changes in traffic flows (i.e. more than 30% for HGVs or for all vehicles) in some locations, which can lead to changes in traffic-related severance for non-motorised users, which are significant. The significant effects with the highest magnitude in each location will be (ordered by road class from south to north):

- A574 Warrington Road (between Cross Lane and A574 Birchwood Park Avenue) – moderate adverse effect due to an increase in HGVs;
- A574 Warrington Road (between Cross Lane and A574 Warrington Road realignment) – moderate adverse effect due to an increase in HGVs;
- A574 Warrington Road (between A574 Warrington Road realignment and Glaziers Lane) – moderate beneficial effect due to an increase in all vehicles;
- A573 Warrington Road (between A580 East Lancashire Road and Park Road) – major adverse effect due to an increase in HGVs;
- A573 Bridge Street/High Street (between Park Road and Heath Street) – major adverse effect due to an increase in HGVs;
- A573 High Street/Church Street (between Heath Street and B5207 Lowton Road) – major adverse effect due to an increase in HGVs;

- Slag Lane (between B5207 Church Lane and Byrom Lane) – major adverse effect due to an increase in HGVs;
- A573 Ashton Road (between B5207 Ashton Road and B5207 Lowton Road) – major adverse effect due to an increase in HGVs;
- A573 Wigan Road realignment (between B5207 Ashton Road and A573 Aye Bridge Road) – moderate adverse effect due to an increase in HGVs;
- B5207 Kenyon Lane (between A572 Newton Road and B5207 Wilton Lane) – major adverse effect due to an increase in HGVs;
- B5207 Church Lane (between A572 Newton Road and A580 East Lancashire Road) – moderate adverse effect due to an increase in HGVs;
- B5232 Newearth Road (between Guided Busway and Shawbrook Avenue) – moderate adverse effect due to an increase in HGVs;
- B5232 Bridgewater Road (between A6 High Street and B5232 Westminster Road) – moderate adverse effect due to an increase in HGVs; and
- Daten Avenue (between A574 Warrington Road and Faraday Street) – moderate adverse effect due to an increase in HGVs.

Accidents and safety

14.4.27 There will be no significant effects on accidents and safety as there are no locations where there are both accident clusters and substantial changes in traffic during construction.

Parking and loading

14.4.28 The Proposed Scheme will have impacts on parking in the local area. This is likely to result in a major adverse effect, which is significant, due to the temporary loss of 84 out of 174 off-street parking spaces at Taylor Business Park due to the construction of the Proposed Scheme.

14.4.29 HS2 Ltd will work with the businesses affected to identify opportunities where reasonably practicable to mitigate effects on parking.

Public transport network

14.4.30 Construction of the Proposed Scheme will not result in any significant effects upon the operation of existing bus services or stops.

14.4.31 There are interfaces with the existing rail network in this area, in particular on the operation of the West Coast Main Line (WCML) and the Liverpool to Manchester Line (Chat Moss) and their passengers and rail freight services. However, the majority of the rail possessions will have little or no impact on the operation of rail services as they will be relatively minor localised works, such as work on and adjacent to the tracks when not in use. In addition, where rail possessions do have the potential to disrupt services, interventions will be combined to reduce the frequency of potential disruption. Since the WCML will be affected by possessions in this and other community areas the impacts and effects of these are

reported in Volume 3. As the possessions on the Liverpool to Manchester Line (Chat Moss), will be short term in nature, the effect on delay to rail passengers and freight services will not be significant.

14.4.32 HS2 Ltd will work with Network Rail and the train and freight operating companies to ensure that any need for additional possessions can be reduced with good planning and communication (including appropriate advance notice).

Non-motorised users

14.4.33 The construction works associated with the Proposed Scheme will require the temporary closure, diversion or realignment of PRoW and roads in the vicinity of the Proposed Scheme, including, where necessary, around construction compounds. In most cases, these will be of a short duration and/or distance and will not have a significant effect on users.

14.4.34 Nonetheless, there will be temporary effects, which are significant, on non-motorised users during construction as a result of changes to journey length and/or hindrances such as substantial changes in levels for non-motorised users due to temporary PRoW and road realignments or diversions at:

- Footpath Croft 15 (also known as New Hall Lane Path) – minor adverse effect from increasing journey length for some users by 467m;
- New Hall Lane (southern section) – minor adverse effect from increasing journey length for some users by 429m;
- Footpath Croft 8 – minor adverse effect from increasing journey length for some users by 107m;
- Footpath Golborne 79/10 – minor adverse effect from increase in journey length of up to 225m;
- Footpath Golborne 78/10 and Footpath Golborne 80/10 – moderate adverse effect from increasing journey length for some users by 507m;
- Footpath Golborne 70/10 – moderate adverse effect from increasing journey length for some users by 583m;
- Footpath Golborne 39/10 and Footpath Golborne 37/10– moderate adverse effect from increasing journey length for some users by 605m;
- Footpath Golborne 31/10 – minor adverse effect from increasing journey length for some users by 151m;
- Footpath Golborne 30/10 – moderate adverse effect from increasing journey length for some users by 671m;
- Footpath Ashton-in-Makerfield 24/10 – minor adverse effect from in increasing journey length for some users by 409m;
- Footpath Ashton-in-Makerfield 22/30 – moderate adverse effect from journey length for some users by 2.3km; and
- Footpath Abram 02/10 – minor adverse effect increasing journey length for some users by 262m.

14.4.35 Permanent diversions to PRoW and roads are reported under the operational assessment.

Permanent effects

14.4.36 Any permanent effects of construction are considered in the assessment of operation for traffic and transport. This is because the impacts and effects of ongoing changes in travel demand and the wider impacts and effects of the operational phase need to be considered together.

Other mitigation measures

14.4.37 The implementation of the measures in the draft CoCP, including travel plans, will help mitigate the transport-related effects during construction of the Proposed Scheme.

14.4.38 No further appropriate traffic and transport mitigation measures have been identified. HS2 Ltd will, however, continue to work with the relevant highway authorities to identify whether further mitigation measures should be provided.

Summary of likely residual significant effects

14.4.39 The temporary residual significant effects during construction remain as described above. These effects will be temporary and reversible in nature lasting only for the duration of the construction works.

14.4.40 The most intensive periods of construction of the Proposed Scheme will cause changes in traffic that will result in the following temporary effects, which are significant, through changes in congestion and/or delays for road users:

- major adverse effects at 25 junctions; and
- minor adverse effects at three junctions.

14.4.41 Changes in traffic during the construction period will result in the following temporary effects, which are significant, on traffic-related severance for non-motorised users:

- major adverse effects on six roads;
- moderate adverse effects on seven roads; and
- moderate beneficial effects on one road.

14.4.42 The loss of parking spaces during the construction period will result in a temporary major adverse effect, which is significant, at one location.

14.4.43 Changes to journey length for non-motorised users during the construction period will result in the following temporary effects, which are significant:

- moderate adverse effects on users of five PRoW; and
- minor adverse effects on users of six PRoW and one road.

Cumulative effects

14.4.44 The assessment includes the cumulative effects of planned and committed development during construction by taking this into account within the background traffic growth.

14.4.45 The assessment also takes into account Proposed Scheme construction traffic and transport impacts of works to construct the Proposed Scheme being undertaken in neighbouring community areas.

14.5 Effects arising from operation

14.5.1 This section presents the likely significant environmental effects of the operation of the Proposed Scheme in 2038 and 2046.

Avoidance and mitigation measures

14.5.2 The following measures have been included as part of the design of the Proposed Scheme and will avoid or reduce impacts on transport users:

- reinstatement of roads on or close to their existing alignments, where reasonably practicable; and
- replacement, diversion or realignment of PRoW.

Assessment of impacts and effects

14.5.3 The following section considers the impacts on traffic and transport and the consequential effects resulting from the operational phase of the Proposed Scheme in 2038 and 2046.

Key operation transport issues

14.5.4 The assessment takes account of all of the impacts of the Proposed Scheme in the Risley to Bamfurlong area. The operation and maintenance of the Proposed Scheme will generate limited vehicular trips and their effect will not be significant.

14.5.5 The operational impacts will, therefore, primarily relate to the permanent diversion, realignment and stopping up of roads, the permanent loss of parking and the permanent diversion or stopping up of PRoW.

Highway network

Strategic and local highway network

14.5.6 The Proposed Scheme will require the permanent widening, diversion, closure or realignment of (ordered by road class from south to north):

- M62 – realignment of a 623m section of the M62, to the east of junction 11. The works will comprise the widening of the central reservation by 5m to accommodate a pier for M62 West viaduct, resulting in a negligible change in journey length;
- A574 Warrington Road – realignment of a 1km section of the A574 Warrington Road, up to 160m east of its existing alignment on an embankment 1km long and up to 6m in height. The A574 Warrington Road realignment will be crossed by the route of the Proposed Scheme on A574 Warrington Road overbridge. The A574 Warrington Road realignment will result in a negligible change in journey length for users between Risley to Culcheth;
- A573 Wigan Road – realignment of a section of the A573 Wigan Road, up to 630m west of its existing alignment for 1.9km, crossed by the route of the Proposed Scheme under A573 Wigan Road viaduct. The existing A573 Wigan Road will be closed where it will be crossed by the route of the Proposed Scheme with access retained for Aye Bridge Farm, Lightshaw Hall, Balmer's Farm, Windy Bank Farm and Wigan Road Farm via a new three-arm priority-controlled (give-way) T-junction. The A573 Wigan Road realignment will result in an increase journey length for some users by 186m;
- B5207 Wilton Lane – realignment of a section of B5207 Wilton Lane, up to 70m north of its existing alignment for 713m. The realigned B5207 Wilton Lane will be crossed by the route of the Proposed Scheme on B5207 Wilton Lane overbridge. The existing B5207 Wilton Lane will be closed where it will be crossed by the route of the Proposed Scheme, resulting in a negligible change in journey length;
- New Hall Lane – diversion of New Hall Lane, comprising the closure of two sections of the existing highway where they will be crossed by the route of the Proposed Scheme. The southern section of New Hall Lane, which currently serves as the access to Taylor Business Park will be stopped up, with access retained to properties on the southern side of the route of the Proposed Scheme. A section of New Hall Lane within Taylor Business Park will be diverted to maintain internal circulation. Access to and egress from Taylor Business Park will be retained by provision of a new priority-controlled (give-way) T-junction on the realigned A574 Warrington Road. Journey length for some users will increase by 218m;
- Glaziers Lane – closure of Glaziers Lane, where it will be crossed by the route of the Proposed Scheme with access retained to the Partridge Lakes Fishery along a realigned section, increasing journey length for some users by 2.6km;
- Culcheth Link Road – a new highway, 600m in length, will run parallel to the south of Culcheth Linear Park to connect the A574 Warrington Road at a three-arm priority-controlled (give-way) T-junction at the southern extent of link road to Wigshaw Lane at a four-arm priority-controlled roundabout at the northern extent;
- Wigshaw Lane – realignment of a section of Wigshaw Lane, up to 180m north-west of its existing alignment on an embankment 670m in length and up to 6m in height, crossed by the route of the Proposed Scheme on Wigshaw Lane overbridge. The Wigshaw Lane realignment will reconnect with the existing Wigshaw Lane at a four-arm priority-controlled roundabout with Culcheth Link Road. Access to private properties on Wigshaw

Lane and Robins Lane will be retained via the southern arm of the junction. The Wigshaw Lane realignment will result in a negligible change in journey length for the majority of users;

- Slag Lane – realignment of a section of Slag Lane, up to 80m south-east of its existing alignment for 752m, crossed by the route of the Proposed Scheme under Slag Lane viaduct. Access to properties to the north of the Proposed Scheme will be retained via a three-arm priority-controlled (give-way) T-junction. Users will be diverted via the realigned Slag Lane, resulting in a negligible change in journey length; and
- Lightshaw Lane – diversion of a section of Lightshaw Lane up to 250m north-west of its existing alignment for 370m to provide access to Lightshaw Hall Farm from the existing A573 Wigan Road. The existing Lightshaw Lane will be closed where it will be crossed by the route of the Proposed Scheme, increasing journey length for some users by 2km.

14.5.7 The permanent diversions or realignments will change journey length for vehicle occupants. Most of the diversions or realignments are less than 1km in length and will not result in any significant effects with regard to changes to journey times for vehicle occupants. However, the closure of Glaziers Lane will increase journey length for highway users by 2.6km resulting in a moderate adverse effect, which is significant. They will also affect non-motorised users, which is considered separately below.

14.5.8 The diversion of traffic associated with highway changes, including the realignment of the A574 Warrington Road and the A573 Wigan Road, will lead to flow changes on the highway network. This will not, however, result in any significant effect on congestion or delays in either 2038 or 2046.

14.5.9 A change in traffic levels can result in changes to traffic-related severance for non-motorised road users, particularly pedestrians using or seeking to cross a road. However, there are no substantial changes in traffic and consequently there are no significant effects in relation to traffic-related severance for non-motorised users.

Accidents and safety

14.5.10 There will be no significant effects on accidents and safety as there are no locations where there are both accident clusters and substantial changes in traffic due to the operation of the Proposed Scheme.

Parking and loading

14.5.11 No significant effects on parking and loading have been identified during operation in the Risley to Bamfurlong area.

Public transport network

14.5.12 The Proposed Scheme is not expected to have a significant effect on public transport operations in the Risley to Bamfurlong area.

Non-motorised users

14.5.13 There will be permanent realignment, diversion or extension of 24 PRoW and seven roads in the Risley to Bamfurlong area that will have an impact on journey lengths or introduce hindrances such as substantial changes in levels for non-motorised users. The Proposed Scheme will also result in a number of permanent highway changes that will affect pedestrians and cyclists.

14.5.14 There will be effects, which are significant, on non-motorised users of 15 of these PRoW and six of these roads as a result of severance from changes in journey length and/or hindrances. These are:

- Footpath Croft 13 – moderate adverse effect from increase in journey length of up to 884m;
- Footpath Croft 15 (also known as New Hall Lane Path) – moderate adverse effect from increase in journey length of up to 729m;
- New Hall Lane (southern section) – moderate adverse effect from increase in journey length of up to 702m;
- A574 Warrington Road – moderate adverse effect from increase in journey length of up to 777m;
- Footpath Croft 19 – moderate adverse effect from increase in journey length of up to 861m;
- Glaziers Lane – moderate adverse effect from increase in journey length of up to 2.4km;
- Wigshaw Lane – minor adverse effect from increase in journey length of up to 94m;
- Footpath Croft 8 – minor adverse effect from increase in journey length of up to 448m;
- Footpath Croft 8a – minor adverse effect from increase in journey length of up to 300m;
- Footpath Croft 108 – moderate adverse effect from increase in journey length of up to 591m;
- Footpath Golborne 63/10 – minor adverse effect from increase in journey length of up to 124m;
- Footpath Golborne 39/10 – minor adverse effect from increase in journey length of up to 123m;
- Footpath Golborne 38/10 – minor adverse effect from increase in journey length of up to 423m;
- Footpath Golborne 37/10 – minor adverse effect from increase in journey length of up to 325m;
- Footpath Golborne 34/10 – minor adverse effect from increase in journey length of up to 435m;
- Slag Lane – minor adverse effect from increase in journey length of up to 410m;
- Footpath Golborne 31/10 – minor adverse effect from increase in journey length of up to 102m;

- Footpath Golborne 30/10 – moderate adverse effect from increase in journey length of up to 1.1km;
- Footpath Golborne 27/10 – minor adverse effect from increase in journey length of up to 160m;
- A573 Wigan Road – minor adverse effect from increase in journey length of up to 200m; and
- Footpath Abram 02/10 – minor adverse effect from increase in journey length of up to 331m.

Other mitigation measures

14.5.15 No further appropriate traffic and transport mitigation measures have been identified. HS2 Ltd will, however, continue to work with the relevant highway authorities to identify whether further mitigation measures should be provided.

Summary of likely residual significant effects

14.5.16 The residual significant effects during operation remain as described above. The highest magnitude effects are summarised below.

14.5.17 The operation of the Proposed Scheme in 2038 and 2046 will result in a moderate adverse effect, which is significant, on one road due to changes in journey lengths for vehicle occupants.

14.5.18 Changes in journey lengths for non-motorised users due to the operation of the Proposed Scheme will result in the following effects, which are significant:

- moderate adverse effects on the users of five PRoW and three roads; and
- minor adverse effects on the users of 10 PRoW and three roads.

Cumulative effects

14.5.19 The assessment includes cumulative effects of planned and committed development during operation, by taking into account background traffic growth in the future baseline.

Monitoring

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

14.5.21 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 Risley to Bamfurlong area. The likely impacts and significant effects identified 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;
- Natural England;
- Warrington Borough Council (WBC) and Wigan Metropolitan Borough Council (WMBC), which are the Lead Local Flood Authorities (LLFA);
- Canal & River Trust; and
- United Utilities Group plc (the local water and sewerage undertaker).

15.1.3 The purpose of this engagement has been to obtain relevant baseline information and to discuss the Proposed Scheme and potential impacts and effects. The engagement has informed the assessments of groundwater level changes at Holcroft Moss Site of Special Scientific Interest (SSSI), which is part of the Manchester Mosses Special Area of Conservation (SAC), flood risk and associated mitigation in the valley of Hey Brook and its associated tributaries and risks to water quality at United Utilities public water supply abstractions.

15.1.4 Maps showing the location of the key environmental features (Map Series CT-10), and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2, MA05 Map Book.

15.1.5 Map Series WR-01, WR-02, WR-03, WR-05 and WR-06, showing details of the water features referred to in this section, are contained in the Volume 5, Water resources and flood risk Map Book.

15.1.6 Detailed information on the water resources and flood risk issues specific to the Risley to Bamfurlong area are contained in the Volume 5 appendices. These comprise:

- Appendix WR-003-0MA05 – Water resources assessment;
- Appendix WR-005-0MA05 – Flood risk assessment;
- Appendix WR-006-00003 – Hydraulic modelling report – Tributaries of Holcroft Lane Brook;
- Appendix WR-006-00004 – Hydraulic modelling report – Small Brook;
- Appendix WR-006-00005 – Hydraulic modelling report – Carr Brook;

- Appendix WR-006-00006 – Hydraulic modelling report – Hey Brook; and
- Appendix WR-008-00001 – Groundwater modelling report – Holcroft Moss.

15.1.7 Volume 5 also includes a detailed route-wide, stand-alone Water Framework Directive (WFD) compliance assessment (WR-001-00000) and a draft route-wide water resources and flood risk operation and maintenance plan (Appendix WR-007-00000).

15.1.8 In addition, the following documents are provided as Background Information and Data (BID)[169]:

- BID WR-004-0MA05 – Water resources baseline; and
- BID WR-002-00001 – Water Framework Directive compliance assessment baseline data.

15.1.9 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 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)[170].

15.1.10 The Proposed Scheme is described in Section 2.

15.1.11 All distances, lengths and area measurements in this section are approximate.

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 EIA Scope and Methodology Report (SMR)[171].

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 alignment of the Proposed Scheme, as described in Section 2.2 of this report. In the Risley to Bamfurlong area, the study area has been extended to include the Risley Moss SSSI and Local Nature Reserve (LNR), which forms part of the Manchester Mosses SAC, and the whole

[169] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data*. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

[170] Ministry of Housing, Communities and Local Government (2019), *National Planning Policy Framework*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf.

[171] Volume 5: Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

of the Pennington Flash WFD lake water body (also designated as a Country Park, LNR and Site of Biological Importance (SBI)).

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 A precautionary approach has been used in the assessment to identify impacts and effects where there is limited information. 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. Where this precautionary approach indicates the requirement for mitigation, preliminary mitigation is described, which may include further data collection and/or assessment.

15.2.5 Hydraulic analysis has been undertaken of watercourses and key structures within flood risk areas. This includes modelling of flood risk impacts on tributaries of Holcroft Lane Brook, Small Brook, Carr Brook, Hey Brook, Nan Holes Brook and Coffin Lane Brook. Interpretation of the hydraulic modelling and details of the analysis carried out can be found in Volume 5: Appendix WR-005-0MA05 – Flood risk assessment.

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 The hydrological impacts on biological receptors such as aquatic fauna and flora are referred to in the Volume 5: Appendix WR-003-0MA05, Water resources assessment and the Volume 5: Appendix WR-001-00000, WFD compliance assessment. Where these impacts have the potential to result in significant effects these are described in Section 7, Ecology and biodiversity, together with any other mitigation required.

15.2.8 Impacts from existing land contamination which lead to significant effects on groundwater quality are presented in Section 10, Land quality. Impacts from the restored Risley landfill site and Lowton sidings historical landfill on groundwater quality are presented in Volume 5: Appendix LQ-001-0MA05.

15.3 Environmental baseline

Existing baseline - Water resources

Surface water

15.3.1 All surface water bodies in the study area fall within the Mersey Lower management catchment of the North West river basin district (RBD).

15.3.2 The current river basin management plan[172] identifies the chemical and ecological status of surface water bodies, and the quantitative and chemical status of groundwater bodies within this RBD.

15.3.3 The statutory objective of the WFD[173] is to achieve 'good status' for all designated water bodies. The purpose of the WFD compliance assessment[174] is to demonstrate that the Proposed Scheme does not result in a deterioration in current water body status, and that water bodies are not prevented from achieving status objectives.

15.3.4 Specialist field surveys have been undertaken, where access has been available. Receptor values have been 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 ditches or ponds, have been identified within this assessment as being of either moderate, high or very high value, based on various criteria including watercourse flow and taking into account any habitat which the watercourse supports.

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 39. The receptor value attributed to each individual water body is based on the methodologies set out in the SMR. The feature locations are indicated by the grid coordinates on the relevant Volume 5, Water resources and flood risk Map Book: Map Series WR-01, at the point closest to the Proposed Scheme.

[172] Environment Agency (2015), *Water for life and livelihoods Part 1: North West river basin district: River basin management plan*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718335/North_West_RBD_Part_1_river_basin_management_plan.pdf.

[173] *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 2017 No. 407).* Available online at: https://www.legislation.gov.uk/uksi/2017/407.

[174] Volume 5: Appendix WR-001-00000 Water Framework Directive compliance assessment.

Table 39: Surface water body receptors

Water body name and location	Type (at closest point to the Proposed Scheme)[175]	Q95 value (m^3/s)[176]	Receptor value	Parent WFD water body name and identification number[177]	Current WFD status/ Objective[178]	Crossed by the Proposed Scheme?
M62 Drainage WR-01-306b – E7	Minor ditch	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	Yes
Holcroft Lane Brook WR-01-306b – F6	Main river	<0.002	Moderate	Glaze GB112069061420	Poor/poor by 2015	Yes
Tributary of Holcroft Lane Brook 1 WR-01-306b – E6	Ordinary watercourse	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Tributary of Holcroft Lane Brook 2 WR-01-306b – F6	Main river	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Tributary of Holcroft Lane Brook 3 WR-01-306b – F6	Ordinary watercourse	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	Yes
Tributary of Holcroft Lane Brook 4 WR-01-306b – G5	Ordinary watercourse	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	Yes
Tributary of Holcroft Lane Brook 5 WR-01-306b – G6	Ordinary watercourse	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Silver Lane Lake Drains WR-01-306b – G6	Minor ditch	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	Yes
Warrington Road Drains WR-01-306b – G4	Minor ditch	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No

[175] The term 'minor ditch' has been used to denote a small trench or drain that has been constructed for the purpose of draining water from the land or roads and is isolated from the wider river network.

[176] This is the flow within the watercourse that is exceeded for 95% of the time. The Q95 has been provided as an indication of watercourse size but is only one of several criteria used to inform receptor value. Other criteria include the WFD watercourse classification which takes into account the value of any habitat which the watercourse supports. Details are provided in the Volume 5, Appendix CT-001-00001, Environmental Impact Assessment Scope and Methodology Report.

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

[178] Status and objectives are based on those set out in the 2015 river basin management plan. The 2015 RBMP is the most up to date and will be updated in 2021.

Water body name and location	Type (at closest point to the Proposed Scheme)[175]	Q95 value (m^3/s)[176]	Receptor value	Parent WFD water body name and identification number[177]	Current WFD status/ Objective[178]	Crossed by the Proposed Scheme?
Culcheth Linear Park Drain 1 WR-01-306b – H5	Minor ditch	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Tributary of Cross Brook 1 WR-01-306b – H4	Ordinary watercourse	<0.002	Moderate	Spittle Brook GB112069061020	Moderate/ good by 2027	Yes
Tributary of Glaze Brook 4 WR-01-306b – I5	Main river	0.002	Moderate	Glaze GB112069061420	Poor/poor by 2015	No
Wigshaw Lane Drains WR-01-306b – I4	Minor ditch	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	Yes
Culcheth Linear Park Drain 2 WR-01-306b – I4	Minor ditch	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Tributary of Cockshot Brook WR-01-307 – B4	Ordinary watercourse	<0.002	Low	Spittle Brook GB112069061020	Moderate/ good by 2027	No
Jibcroft Brook WR-01-307 – B5	Ordinary watercourse	<0.002	Moderate	Glaze GB112069061420	Poor/poor by 2015	No
Tributary of Carr Brook 1 WR-01-307 – C6	Ordinary watercourse	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Tributary of Carr Brook 2 WR-01-307 – C7	Ordinary watercourse	<0.002	Low	Glaze GB112069061420	Poor/poor by 2015	No
Carr Brook WR-01-307 – D6	Ordinary watercourse	0.003	Moderate	Glaze GB112069061420	Poor/poor by 2015	Yes
Small Brook WR-01-307 – E7	Main river	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Pennington Flash 1 WR-01-307 – E7	Ordinary watercourse	<0.002	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Pennington Flash WR-01-307 – E8	Static waterbody	N/A	High	Pennington Flash GB31232085	Moderate/ good by 2027	No
Slag Lane Drains WR-01-307 – E6	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Sandy Lane Drain 1 WR-01-307 – E6	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No

Water body name and location	Type (at closest point to the Proposed Scheme)[175]	Q95 value (m^3/s)[176]	Receptor value	Parent WFD water body name and identification number[177]	Current WFD status/ Objective[178]	Crossed by the Proposed Scheme?
Tributary of Hey Brook 1 WR-01-307 – F6	Ordinary watercourse	0.003	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Hey Brook 3 WR-01-307 – F5	Main river	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Hey Brook 2 WR-01-307 – F6	Ordinary watercourse	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Hey Brook WR-01-307 – H6	Main river	0.04	High	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Tributary of Hey Brook 4 WR-01-307 – F6	Ordinary watercourse	0.002	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Lowton Road Drains WR-01-307 – G5	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Tributary of Pennington Flash 2 WR-01-307 – F7	Ordinary watercourse	0.002	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Leeds and Liverpool Canal WR-01-307 – F7	Canal	N/A	Very High	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Haydock Branch Junction Drains WR-01-307 – G4	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Windy Bank Brook WR-01-307 – G5	Ordinary watercourse	<0.002	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Wigan Road Drain WR-01-307 – H5	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Nan Holes Brook 1 WR-01-307 – H5	Ordinary watercourse	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Nan Holes Brook 2 WR-01-307 – H5	Ordinary watercourse	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Nan Holes Brook WR-01-307 – H4	Main river	<0.002	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes

Water body name and location	Type (at closest point to the Proposed Scheme)[175]	Q95 value (m^3/s)[176]	Receptor value	Parent WFD water body name and identification number[177]	Current WFD status/ Objective[178]	Crossed by the Proposed Scheme?
Tributary of Hey Brook 5 WR-01-307 – H5	Ordinary watercourse	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Coffin Lane Brook 2 WR-01-307 – H4	Ordinary watercourse	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Locker Lane Drain WR-01-307 – H5	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Coffin Lane Brook WR-01-307 – I5	Main river	0.004	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	Yes
Tributary of Coffin Lane Brook 1 WR-01-307 – I6	Ordinary watercourse	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Tributary of Hey Brook 6 WR-01-307 – J6	Ordinary watercourse	<0.002	Moderate	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No
Bamfurlong Drains WR-01-307 – I6	Minor ditch	<0.002	Low	Hey/Borsdane Brook GB112069064520	Moderate/ good by 2027	No

Abstractions and permitted discharges (surface water)

15.3.6 Table 40 sets out the surface water abstractions and permitted discharges within 1km from the route of the Proposed Scheme in the Risley to Bamfurlong area.

Table 40: Surface water abstraction and permitted discharges in the study area

Feature	Details	Value
Licensed surface water abstractions	None	None
Registered private unlicensed surface water abstractions	None	None
Consented discharges to surface water	Sixteen, of which four are within the land required for the construction of the Proposed Scheme.	Low

15.3.7 Private unlicensed surface water abstractions comprise those for quantities of less than $20m^3$ per day. There is no obligation to register private water supplies, but available records have been obtained from the local authorities. Unregistered private surface water supplies may be present. Private water supplies are assumed to be high value receptors unless details obtained from supply owners indicated otherwise.

15.3.8 The number of abstractions and permitted discharge listed in Section 10, Land quality may be different to that stated here, due to different definitions of spatial scope. This is because the water resources and flood risk study area comprises all land within 1km of the route of

the Proposed Scheme, whereas the default land quality study area comprises all land within 250m from the land required for the construction of the Proposed Scheme. The default study areas may be extended where the potential for pathways to more remote receptors exists.

Groundwater

15.3.9 The location of abstractions, geological formations and indicative groundwater levels, where available, are shown in Volume 5, Water resources and flood risk Map Book: Map Series WR-02.

15.3.10 The geology of the study area, including distribution and formation description, is described in Section 10, Land quality. The aquifer classification, WFD status and receptor value of the superficial and bedrock hydrogeology is summarised in Table 41 (for superficial deposits) and Table 42 (for bedrock). Unless stated otherwise, the geological groups listed will all be crossed by the Proposed Scheme. The current overall status of, and objective for, the WFD groundwater body is as stated in the current river basin management plan. Where the Environment Agency has not assigned an individual water body ID to a unit, it has been assumed that it is connected to the underlying or overlying water body.

Table 41: Summary of geology and hydrogeology in the study area – superficial deposits

Geology	Aquifer classification	WFD body (ID) and current overall status	WFD status objective	Receptor value
Peat	Unproductive	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Alluvium	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor	Good by 2027	Moderate
Lacustrine deposits Not crossed by the route of the Proposed Scheme	Unproductive	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Head	Secondary (Undifferentiated)	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor	Good by 2027	Moderate
Glaciofluvial deposits	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor	Good by 2027	Moderate
Glaciofluvial ice contact deposits	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer	Good by 2027	Moderate

Geology	Aquifer classification	WFD body (ID) and current overall status	WFD status objective	Receptor value
Not crossed by the route of the Proposed Scheme		(GB41202G991700) Poor		
Glaciofluvial sheet deposits	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor	Good by 2027	Moderate
Glaciolacustrine deposits	Unproductive	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Glacial till	Secondary (Undifferentiated)	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor	Good by 2027	Moderate

Table 42: Summary of geology and hydrogeology in the study area - bedrock

Geology	Aquifer classification	WFD body (ID) and current overall status	WFD status objective	Receptor value
Mercia Mudstone Group - Tarporley Siltstone Formation Not crossed by the route of the Proposed Scheme	Secondary B	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Sherwood Sandstone Group - Helsby Sandstone Formation	Principal	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone aquifers (GB41201G101700) Poor	Good by 2027	High
Sherwood Sandstone Group - Wilmslow Sandstone Formation	Principal	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone aquifers (GB41201G101700) Poor	Good by 2027	High
Sherwood Sandstone Group - Chester Formation	Principal	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone aquifers (GB41201G101700) Poor	Good by 2027	High

Geology	Aquifer classification	WFD body (ID) and current overall status	WFD status objective	Receptor value
Kinnerton Sandstone Formation[179]	Principal	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone aquifers (GB41201G101700) Poor	Good by 2027	High
Cumbrian Coast Group - Manchester Marls Formation	Secondary B	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone aquifers (GB41201G101700) Poor	Good by 2027	Moderate
Appleby Group - Collyhurst Sandstone Formation	Principal	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone aquifers (GB41201G101700) Poor	Good by 2027	High
Pennine Coal Measures Group - Pennine Middle Coal Measures Formation	Secondary A	Sankey and Glaze Carboniferous aquifers (GB41202G100100) Poor	Good by 2027	Moderate

Superficial deposit aquifers

15.3.11 The basis of the receptor values attributed to the superficial deposit aquifers present within the study area, as shown in Table 41, is outlined briefly as follows:

- alluvium, glaciofluvial deposits, glaciofluvial ice contact deposits and glaciofluvial sheet deposits are classified as Secondary A aquifers. These aquifers may be capable of supporting water supplies at a local rather than regional scale and may also form an important source of baseflow to surface watercourses. They have, therefore, been assessed as moderate value receptors;
- head and glacial till are classified as Secondary (Undifferentiated) aquifers and may be capable of supporting water supplies at a local rather than regional scale and may also form an important source of baseflow to surface watercourses. They have, therefore, been assessed as moderate value receptors; and
- peat, lacustrine deposits and glaciolacustrine deposits are classified as unproductive strata. These may yield limited amounts of groundwater and supply limited baseflow to watercourses. They have, therefore, been assessed as low value receptors.

[179] Ambrose, K., Hough, E., Smith, N. J. P., And Warrington, G. (2014), *Lithostratigraphy of the Sherwood Sandstone Group of England, Wales and south-west Scotland.* British Geological Survey Research Report, RR/14/01. Recent updates to the nomenclature used to describe these formations have removed the Kinnerton Sandstone Formation from the Sherwood Sandstone Group.

Bedrock aquifers

15.3.12 The basis of the receptor values attributed to the bedrock aquifers present within the study area, as shown in Table 42, is outlined briefly as follows:

- the Sherwood Sandstone Group (locally comprising the Helsby Sandstone Formation, Wilmslow Sandstone Formation and Chester Formation), the Kinnerton Sandstone Formation and the Collyhurst Sandstone Formation (a part of the Appleby Group) have been classified as Principal aquifers by the Environment Agency. Principal aquifers can provide water supplies that are of strategic importance and can also contribute an important component of baseflow to rivers. They have, therefore, been assessed as high value receptors;
- the Pennine Coal Measures Group (Middle Coal Measures Formation) is classified as a Secondary A aquifer. The aquifer can support abstractions on a local scale and may also provide an important contribution to river baseflow. It is, therefore, assessed as a moderate value receptor; and
- the Manchester Marls Formation (Cumbrian Coast Group) and the Tarporley Siltstone Formation (Mercia Mudstone Group) are classified as Secondary B aquifers. Both formations have traditionally been regarded as predominantly impermeable, or at best poor aquifers. Limited quantities of groundwater suitable for domestic or agricultural use are, however, occasionally obtainable within these rock formations. They have, therefore, been classified as moderate value receptors.

WFD status of groundwater bodies

15.3.13 A summary of the locations, current overall WFD status, and future overall status objectives associated with the designated bedrock groundwater bodies within the study area is provided in Table 42. The value attributed to each of these receptors is also indicated. Some of the superficial and bedrock aquifers in the study area are not formally designated as WFD groundwater bodies. However, these aquifers may be hydraulically connected to the overlying WFD superficial and/or adjacent WFD bedrock groundwater bodies.

Abstraction and permitted discharges (groundwater)

15.3.14 Table 43 sets out the groundwater abstraction and permitted discharges within 1km of the route of the Proposed Scheme in the Risley to Bamfurlong area.

Table 43: Groundwater abstraction and permitted discharges in study area

Feature	Details	Value
Source Protection Zones (SPZ) associated with licensed public water supplies	SPZ3 potentially associated with abstraction north-east of Croft within land required for construction of the Proposed Scheme	Very high
SPZ associated with licensed public water supplies	SPZ1, 2 and 3 south of Kenyon (SPZ3 is crossed by the route of the Proposed Scheme)	Very high
SPZ associated with licensed public water supplies	SPZ1, 2 and 3 located south of Wash End (SPZ2 is crossed by the route of the Proposed Scheme)	Very high

Feature	Details	Value
SPZ associated with licensed public water supplies	SPZ1, 2 and 3 located south of Wash End (SPZ3 is crossed by the route of the Proposed Scheme)	Very high
SPZ associated with licensed public water supplies	SPZ1, 2 and 3 located south-west of Wash End (SPZ3 is crossed by the route of the Proposed Scheme)	Very high
SPZ associated with licensed public water supplies	SPZ1, 2 and 3 located west of Pennington Flash (SPZ3 crossed by the route of the Proposed Scheme)	Very high
SPZ associated with licensed public water supplies	SPZ1, 2 and 3 located north of Lowton, south-west of Byrom Wood (SPZ3 crossed by the route of the Proposed Scheme)	Very high
Private licensed groundwater abstractions	One at Leigh Golf Club for commercial supply	High
Registered unlicensed private groundwater abstractions	One at Phillips Farm, assumed for potable supply	High
Consented discharges to groundwater	One soakaway from domestic property to underground strata	Low
Consented discharges to groundwater	One soakaway from septic tank to underground strata	Low

Groundwater – surface water interactions

15.3.15 A desk-based assessment using Ordnance Survey maps and detailed river network data provided by the Environment Agency identified 29 features within the study area that have the potential to be springs or sinks. Access was possible to inspect 17 of these features. The value of these features has been determined based on consideration of the feature's importance as a water resource as well as any ecological, heritage, cultural or community asset importance. Further details on these features can be found in BID WR-004-0MA05[169]. Of the 17 features inspected:

- one feature was confirmed to be a spring supporting a local undesignated water dependent habitat. It has, therefore, been assessed as a high value receptor;
- one feature within the land required for the construction of the Proposed Scheme was confirmed to be a spring supporting a high value stream. It has, therefore, been assessed as a high value receptor;
- one feature within the land required for the construction of the Proposed Scheme was confirmed to be a spring which supports a moderate value stream. It has, therefore, been assessed as a moderate value receptor;
- one feature within the land required for the construction of the Proposed Scheme was confirmed to be a 'collect' which supports a moderate value stream. A 'collect' is an area of groundwater seepage which eventually drains into a single channel. This 'collect' has, therefore, been assessed as a moderate value receptor;
- seven potential features were verified as land drainage features and are included in the surface water assessment; and
- six features were identified to be culverts and not groundwater features.

15.3.16 The remaining 12 potential spring features are assumed to be high value receptors on a precautionary basis, pending site inspection. None of these are located within the land required for construction of the Proposed Scheme.

15.3.17 There are 66 ponds within the land required for the construction of the Proposed Scheme. Where there is the potential for the Proposed Scheme to have significant effects on these features the assessment, and any mitigation required, is presented in Section 7, Ecology and biodiversity.

Water dependent habitats

15.3.18 The following nature conservation sites within the study area are potentially groundwater dependent:

- Manchester Mosses SAC comprises three sites located west of Salford, two of which, Holcroft Moss SSSI and Risley Moss SSSI and LNR, are located within the study area. The third site, Astley and Bedford Mosses SSSI, is located 1.6km north of land required for the construction of the Proposed Scheme and has not been included in the assessment;
- Holcroft Moss SSSI is located 40m east of the proposed M62 West viaduct. The site is adjacent to the M62 which will be used as a construction traffic route. A high-pressure gas main is situated beneath the southern part of the SSSI and is required to be decommissioned as part of the construction of the Proposed Scheme. The whole of Holcroft Moss is assessed within the Risley to Bamfurlong area. Holcroft Moss SSSI is designated as the only known uncut area of peat and raised bog remaining in Cheshire. The site is predominantly rainwater fed, but it is currently unclear if groundwater in the glacial till and glaciofluvial sheet deposits, and possibly the underlying Helsby Sandstone Formation, help to support water levels in the peat by reducing drainage from its base;
- Risley Moss SSSI and LNR is located 520m south of land required for the construction of the Proposed Scheme. Risley Moss is underlain by peat and is designated for its raised bog habitat. Water levels at the site have been raised to encourage re-establishment of an active mire system. The site is likely to be dependent on surface water and groundwater, potentially from the glacial till and/or Mercia Mudstone Group; and
- Bryn Marsh and Ince Moss SSSI is part of the Wigan Flashes LNR (which also includes Horrocks Flash SBI). The Bryn Marsh and Ince Moss SSSI is located adjacent to land required for the construction of the Proposed Scheme. The SSSI contains various wetland habitats including open water, swamp, tall fen, mire, reedbeds and wet woodland. It is likely to be dependent on groundwater potentially fed from the alluvium and Pennine Middle Coal Measures Formation.

15.3.19 Abram Flashes SSSI is dependent on surface water flows. The western boundary of Abram Flashes SSSI is adjacent to land required for the construction of the Proposed Scheme. The site is a series of wetland habitats including open water, swamp, wet grassland and tall herb fen. The flashes are adjacent to the Leeds and Liverpool Canal and are bordered and intersected by the Hey Brook. The open water is supported by surface water flows (Hey

Brook). However, the wet grassland may be supported by either surface water or groundwater from the alluvium (Secondary A aquifer).

15.3.20 A detailed description of the ecology of these sites is provided in Volume 5 reports relating to ecology and biodiversity.

Existing baseline – flood risk and land drainage

15.3.21 The Environment Agency's Flood map for planning (rivers and sea)[180] has been used to scope the baseline flood risk for fluvial flooding from main rivers and ordinary watercourses. These maps 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). The Risk of Flooding from Surface Water map[181] has been used to scope surface water flood risks and potential fluvial flood risk for ordinary watercourses where no Environment Agency Flood map for planning (rivers and sea) is available. All of these flood zones are shown in Volume 5, Water resources and flood risk Map Book: Map Series WR-01.

15.3.22 Infrastructure failure flood risks have been scoped using the Environment Agency Risks of flooding from reservoirs national dataset[182]. The British Geological Survey (BGS) Susceptibility to groundwater flooding dataset[183] has been used to assess the future risk of groundwater flooding.

15.3.23 The following reports were used to help determine the baseline flood risk within the study area:

- WBC Preliminary Flood Risk Assessment (PFRA) (2017)[184] and WMBC PFRA (2011)[185];

[180] Environment Agency (2021), *Flood map for planning*. Available online at: https://flood-map-for-planning.service.gov.uk.

[181] Environment Agency (2021), *Long term flood risk information.* Available online at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/.

[182] Environment Agency (2020), *Risk of Flooding from Reservoirs – Maximum Flood Extent (Web Mapping Service*). Available online at: https://data.gov.uk/dataset/44b9df6e-c1d4-40e9-98eb-bb3698ecb076/risk-of-flooding-from-reservoirs-maximum-flood-extent-web-mapping-service.

[183] British Geological Survey (2021), *Susceptibility to groundwater flooding dataset*. Available online at: http://www.bgs.ac.uk/products/hydrogeology/groundwaterFlooding.html.

[184] Warrington Borough Council (2017), *Warrington Preliminary Flood Risk Assessment (PFRA)*. Available online at: https://www.warrington.gov.uk/sites/default/files/2019-10/preliminary_flood_risk_assessment_pfra_2017_-_2023.pdf.

[185] JBA Consulting (2011), *Wigan Preliminary Flood Risk Assessment (PFRA)*. Available online at: https://www.wigan.gov.uk/Docs/PDF/Resident/Crime-Emergencies/Flood-Risk-Assessment.pdf.

- WBC Strategic Flood Risk Assessment (SFRA) (2011)[186] and WMBC SFRA (2011)[187]; and
- WBC Local Flood Risk Management Strategy (LFRMS) (2017)[188] and WMBC LFRMS (2014)[189].

15.3.24 Historical flood investigation reports published by the LLFA, under Section 19 of the Flood and Water Management Act[190], relevant to this area have been reviewed (see Volume 5: Appendix WR-005-0MA05 - Flood risk assessment for further details). There have been two historical flood events within 1km of the land required for the Proposed Scheme for which investigations under Section 19 of the Flood and Water Management Act were published: the Stone Pit Lane event (December 2015) and the Greater Manchester event (December 2015).

River flooding

15.3.25 The study area includes areas at risk of flooding associated with the tributaries of Holcroft Lane Brook 2, 3 and 4, Carr Brook and Small Brook. The study area also includes areas of Flood Zone 2 and 3 associated with Hey Brook. Other floodplains that will be crossed by the alignment of the Proposed Scheme include those associated with Nan Holes Brook, Coffin Lane Brook and Windy Bank Brook. Table 44 shows all relevant watercourses within the study area with receptors that would potentially be affected by any changes in level and extent of flooding. The value of these receptors, based on the definitions in Section 21 of the SMR, is also indicated. The location description and figure/coordinate is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 5, Water resources and flood risk Map Book: Map Series WR-01.

[186] JBA Consulting (2011), *Warrington Strategic Flood Risk Assessment (SFRA)*. Available online at: https://www.warrington.gov.uk/sites/default/files/2019-08/warrington_strategic_flood_risk_assessment_ii_vol_1_2011.pdf.

[187] JBA Consulting (2011), *Wigan Strategic Flood Risk (SFRA)*. Available online at: https://www.wigan.gov.uk/Docs/PDF/Council/Strategies-Plans-and-Policies/Planning/Environment/FloodRiskAssessmentReport1411kb.pdf.

[188] JBA Consulting (2017), *Warrington Local Flood Risk Management Strategy (LFRMS)*. Available online at: https://www.warrington.gov.uk/sites/default/files/2019-10/local_flood_risk_management_strategy_2017_v7_af_approved.pdf.

[189] Wigan Metropolitan Borough Council (2014), *Wigan Local Flood Risk Management Strategy (LFRMS)*. Available online at: https://www.wigan.gov.uk/Docs/PDF/Resident/Crime-Emergencies/Flood-Risk-Management-Strategy.pdf.

[190] *Flood and Water Management Act 2010*, Section 19. Her Majesty's Stationery Office, London. Available online at: http://www.legislation.gov.uk/ukpga/2010/29/contents.

Table 44: River flood risk sources and receptors

Source	Location description and figure/coordinate	Receptor potentially affected	Receptor value/ sensitivity to flooding
Tributaries of Holcroft Lane Brook 2, 3 and 4	East of the restored Risley landfill site WR-01-306b - F6	Footpath Croft 13	Moderate
Tributaries of Holcroft Lane Brook 2, 3 and 4	HMP Risley WR-01-306b - G4	HMP Risley	High
Tributaries of Holcroft Lane Brook 2, 3 and 4	North of HMP Risley WR-01-306b - G4	Residential property	High
Hey Brook	South of Abram WR-01-307 - H6	A573 Wigan Road	Moderate
Hey Brook	North of Aye Bridge Farm WR-01-307 - H6, H5	Agricultural land	Moderate
Carr Brook	Brancaster Drive, Lowton Common WR-01-307 - D6	Residential properties downstream of the crossing along Brancaster Drive	High
Carr Brook	Brancaster Drive, Lowton Common WR-01-307 - D6	Brancaster Drive	Moderate
Carr Brook	Roads upstream of crossing, Lowton St Mary's WR-01-307 - D6, D55	Residential properties upstream of the crossing along Cedar Avenue, Maple Avenue, Beech Avenue and Kings Avenue	High
Carr Brook	Lowton St Mary's WR-01-307 - D6	Lowton Junior and Infant School	High
Carr Brook	Lowton St Mary's WR-01-307 - D5, D6	A580 East Lancashire Road	Moderate
Small Brook	East of Lowton WR-01-307 - E6	Agricultural land	Moderate
Small Brook	Pennington Flash Country Park WR-01-307 - E7	Footpath and roads at Pennington Flash Country Park	Moderate
Small Brook	Egerton Road, Lowton WR-01-307 - E5, E6	Egerton Road	Moderate
Small Brook	Lowton WR-01-307 - E5	Residential properties along Elmridge Court and Cherry Tree Road	High
Nan Holes Brook	South of Aye Bridge Farm WR-01-307 - H5	A573 Wigan Road	Moderate
Nan Holes Brook	South of Aye Bridge Farm WR-01-307 - H5, H6, G6	Agricultural land	Moderate
Coffin Lane Brook	Bryn Gates WR-0-307 - I4	A58 Bolton Road	Very high

Source	Location description and figure/coordinate	Receptor potentially affected	Receptor value/ sensitivity to flooding
Coffin Lane Brook	South of Bryn Gates WR-01-307 - I4, I5	Scrubland	Low
Windy Bank Brook	North of Edge Green WR-01-307 - G5	A573 Wigan Road	Moderate
Windy Bank Brook	North of Edge Green WR-01-307 - G5	Agricultural land	Moderate

Surface water flooding

15.3.26 There are numerous areas that are susceptible to surface water flooding within the study area. The key sources and receptors with potential to be affected are shown in Table 45. The value of these receptors, based on Section 21 of the SMR, is also indicated. The location description and figure/coordinate is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 5, Water resources and flood risk Map Book: Map Series WR-01.

Table 45: Surface water flood risk sources and receptors

Source	Location description and figure/coordinate	Receptor potentially affected	Receptor value
Surface water flow path at Glaziers Lane Farm	Glaziers Lane WR-01-306b - H5	Glaziers Lane	Moderate
Surface water flow path at Glaziers Lane Farm	Wigshaw Lane WR-01-306b - H4, H5	Wigshaw Lane	Moderate
Surface water flow path at Glaziers Lane Farm	Glaziers Lane WR-01-306b - H5	Residential property	High
Surface water flow path in Lowton St Mary	Lowton St Mary WR-01-307 - D6	Residential properties	High
Surface water flow path in Lowton St Mary	Lowton St Mary WR-01-307 - D6	A572 Newton Road, Hesketh Meadow Lane	Moderate
Surface flow path north of Garton Common	Garton Common WR-01-307 - E6	Slag Lane	Moderate
Surface flow path north of Garton Common	Garton Common WR-01-307 - E6	Residential properties	High

Artificial water bodies

15.3.27 Flooding from artificial water bodies may occur due to failure of an impounding structure, such as a dam or canal embankment. There are no artificial water bodies with potential implications for flood risk within the study area.

Groundwater flooding

15.3.28 Information related to historical incidents of groundwater flooding in the Risley and Bamfurlong area is provided within the SFRA[186,187] and LFRMS[188,189]. The SFRA and LFRMS state that there is no history of groundwater flooding within the study area.

15.3.29 The BGS susceptibility to groundwater flooding dataset indicates that there is some potential for groundwater flooding to occur along Windy Bank Brook, Nan Holes Brook and Coffin Lane Brook floodplains. The Proposed Scheme is largely underlain by glacial till, which has the potential to be susceptible to groundwater flooding in this area.

Land drainage

15.3.30 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.

Future baseline

Construction (2025)

15.3.31 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2025. The committed development relevant to water resources and flood risk during construction in this area is set out in Table 46.

Table 46: Committed developments of relevance to water resources and flood risk during construction

Map book reference[191]	Planning reference	Description	How this is considered in the assessment
MA05/092	Wigan Local Plan Core Strategy (2013) SP4.1 South of Hindley SP4.4 East of Wigan Road SP4.5 Golborne and Lowton	Location: land south of Hindley (SP4.1), land east of Wigan Road, Landgate, Ashton in Makerfield (SP4.4), land at Rothwell's Farm, Lowton Road, Golborne (SP4.5), land east of Stone Cross Lane, Lowton (SP4.5), and land at Pocket Nook Lane, Lowton (SP4.5). SP4.1 - Employment and housing. Approx. 1000 dwellings. SP4.4 – Employment and housing development. Approx. 300 dwellings. SP4.5 – Housing development. Approx. 1000 dwellings over three sites.	Informing future baseline.

[191] Volume 5, Planning Data/Committed Development Map Book: Maps CT-13-314b to CT-13-318.

15.3.32 Implementation of the committed development will result in an increase of the number of flood risk receptors around the Carr Brook. As such, this committed development has been included as part of the future baseline and considered within this assessment.

Operation (2038)

15.3.33 Volume 5: Appendix CT-004-00000 provides details of the developments in the Risley to Bamfurlong area that are assumed to have been implemented by 2038. No additional committed developments have been identified in this study area that will materially alter the baseline conditions in 2038 for water resources and flood risk.

Climate change

15.3.34 Detailed analysis of the potential impacts of climate change on the Proposed Scheme has been undertaken and is reported in Volume 3, Route-wide effects Section 4. In general, the design of the Proposed Scheme has adopted a precautionary approach to potential future increase in peak river flows and rainfall intensities.

15.3.35 Although no definitive guidance is available, climate change may also affect future surface water and groundwater resources. However, any such changes are unlikely to alter the significance of the effects identified in this assessment.

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 Construction Practice (CoCP)[192] includes a range of mitigation measures that 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

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 and their

[192] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice.

associated floodplains. Instead, it will 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, MA05 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:

- Holcroft Lane Brook (700m in length);
- Tributary of Holcroft Lane Brook 1 (17m in length);
- Tributary of Holcroft Lane Brook 2 (360m in length including 20m of culvert);
- Tributary of Holcroft Lane Brook 4 (100m in length);
- Carr Brook (440m in length including 50m of culverts and 76m of aqueduct);
- Small Brook (225m in length including 7m culvert);
- Tributary of Hey Brook 1 (90m in length including 35m of culvert);
- Tributary of Hey Brook 4 (150m in length including 15m of culvert);
- Windy Bank Brook (100m in length including 60m of culvert);
- Tributary of Nan Holes Brook 1 (160m in length including 60m of culvert);
- Nan Holes Brook (80m in length including 35m culvert);
- Hey Brook flood relief channel (200m in length);
- Coffin Lane Brook (75m in length including 60m of culvert); and
- Tributary of Coffin Lane Brook 1 (50m in length including 25m of culvert).

15.4.6 Realignments will be designed to have equivalent hydraulic capacity to the existing channels, as far as reasonably practicable. Where such watercourses are natural channels, appropriate features to replicate and, where reasonably practicable, enhance their hydromorphological condition. The 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. The design of these realignments will be developed in consultation with the Environment Agency and the LLFA, with due consideration of WFD status objectives. The design of the Proposed Scheme will also ensure that existing drainage outfalls can be adapted to discharge into the new channel.

15.4.7 Watercourse diversions, which would result in changes in flow regime within discrete sections of channel, have been avoided wherever reasonably practicable. There are diversions proposed within this study area at:

- Tributary of Holcroft Lane Brook 3 (360m in length);
- Tributary of Holcroft Lane Brook 4 (50m in length);
- Tributary of Cross Brook 1 (100m in length);
- Tributary of Hey Brook 2 (180m in length);
- Tributary of Hey Brook 3 (190m in length); and
- Tributary of Hey Brook 5 (405m in length with 90m of culvert).

15.4.8 For watercourses that are not in their natural condition, where reasonably practicable, the watercourse diversion design will incorporate measures to improve their hydromorphological condition. The design of these diversions will be developed in consultation with the Environment Agency and the LLFA, with due consideration of WFD status objectives.

15.4.9 Infrastructure required within or in proximity to an existing channel (including bridge abutments, intermediate piers and outfalls) will be designed to reduce impacts on the natural hydromorphology of watercourse channels, as far as is reasonably practicable.

15.4.10 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;
- 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.

15.4.11 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.

15.4.12 Permanent culverts proposed on the smaller watercourse crossings within the Risley to Bamfurlong area include those on:

- Tributary of Holcroft Lane Brook 1 (10m of culvert);
- Tributary of Holcroft Lane Brook 2 (20m of culvert including the Holcroft Lane Brook offline culvert 10m in length);
- Tributary of Holcroft Lane Brook 4 (Holcroft Lane Brook culvert 15m in length);
- Carr Brook (50m of culvert including Newton Road access offline culvert 35m in length, Golborne Pumping Station access culvert 15m in length and Carr Brook aqueduct 76m long);
- Tributary of Carr Brook 1 (5m of culvert);
- Small Brook (Golborne Footpath 63 and Small Brook culvert 7m in length);
- Tributary of Hey Brook 1 (70m of culvert including the Garton Common culvert 35m in length);
- Tributary of Hey Brook 4 (20m of culvert including the Golborne Footpath 31/10 and Critchley culvert 15m in length);
- Windy Bank Brook (Footpath Golborne 27/10 underbridge and Windy Bank culvert 60m in length);
- Tributary of Nan Holes Brook 1 (60m of culvert);
- Nan Holes Brook (85m of culvert including Nan Holes Brook culvert 35m in length and Nan Holes Brook offline culvert 50m in length);
- Tributary of Hey Brook 5 (90m of culvert including Hey Brook Tributary culvert 80m in length and Hey Brook Tributary offline culvert 10m in length);
- Coffin Lane Brook (Coffin Lane Brook culvert 60m in length); and
- Tributary of Coffin Lane Brook 1 (35m of culvert including the Hey Brook culvert 25m in length).

15.4.13 The 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;
- culvert lengths have been made as short as 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.

15.4.14 The wider issues associated with these culverts, and how, as far as reasonably practicable, the design will ensure no deterioration in the status of any of the relevant water body's WFD quality elements, is considered within the Volume 5, WFD compliance assessment. Any mitigation required in response to significant ecological effects of these culverts is set out in Section 7, Ecology and biodiversity.

15.4.15 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 remove potential pollution pathways. If boreholes are to be decommissioned and replaced with alternatives, the contractors will follow the latest industry standard. 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 a spring is to be covered or displaced by design elements then additional mitigation measures may be applied to relocate the spring, where reasonably practicable.

15.4.16 Measures will be introduced, as required, to mitigate the temporary and permanent effects on groundwater flows and water quality during excavation and construction of foundations and cuttings, as far as is reasonably practicable. The types of measure that could be adopted include:

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

15.4.17 The exact requirements will be refined, and method of mitigation will be designed following ground investigation at foundations and cutting locations where appropriate.

15.4.18 For major utilities, the following specific measures are considered in addition to the above points:

- trenchless crossing techniques will be used wherever reasonably practicable for main rivers, sensitive watercourses and key designations to reduce the impact on these features;
- where temporary watercourse diversions are required, during the reinstatement the watercourse will be returned to its natural course and condition where reasonably practicable after work is complete, with due consideration to its WFD status objectives; and
- hard bank reinforcement will be avoided at watercourse crossings where reasonably practicable.

15.4.19 No borrow pits are proposed in the Risley to Bamfurlong area.

Flood risk and land drainage

15.4.20 The design of the Proposed Scheme will, as far as reasonably practicable, 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 realignment of the A573 Wigan Road, which intersects the Windy Bank Brook, Nan Holes Brook and Hey Brook floodplains. The Proposed Scheme includes replacement floodplain storage areas to compensate for the loss of flood storage volume associated with the piers and A573 Wigan Road highway realignment;
- the temporary works shown on Map Series CT-05 in the Volume 2, MA05 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, structures will be designed to accommodate flood flows up to and including the 1 in 100 (1%) annual probability flood with an allowance for climate change;
- runoff from the footprint of the infrastructure could occur more rapidly post-construction due to steeper slope angles and the permeability (or compacted nature) of the newly-created surfaces. The drainage systems will be designed to ensure that there will be no significant increases in flood risk, during storms up to and including the 1 in 100 (1%) annual probability design event, with an allowance for climate change;
- 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 to limit overland flow into the cutting. This overland flow along with seepage and runoff from the cuttings will, where reasonably practicable, 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.

15.4.21 The nominated undertaker will, as far as reasonably practicable, ensure that flood risk is managed throughout the construction period when planning sites and storing materials. If necessary, temporary provision will be made to reduce the potential for impacts on existing

land drainage systems during construction. Some of the specific measures referred to in the draft CoCP, include:

- having regard to the requirement for construction activities to avoid any increases in flood risk to vulnerable receptors;
- preparation of flood risk assessments and method statements for temporary works, including construction 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; and
- 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.

15.4.22 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 any impacts on existing land drainage systems are managed appropriately.

15.4.23 For major utilities, the following specific measures are considered in addition to the above points:

- trenchless crossing techniques will be used wherever practicable for main rivers/sensitive watercourses to reduce the impact of temporary watercourse diversions on flood risk; and
- at watercourse crossings, hard bank reinforcement and piers in floodplains will be avoided where reasonably practicable.

Assessment of impacts and effects

15.4.24 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 included in 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

Surface water

15.4.25 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.

15.4.26 Construction compounds may have substantial water demands that may require approval through the Protective Provisions in the Bill for abstractions to augment other supply options. The assessment will include location-specific engagement with the Environment Agency and other water undertakers on the availability of water at that location. The Environment Agency will be able to impose conditions on any abstractions approved so that no significant effects are likely to arise. In this case, in the Risley to Bamfurlong area, the current Environment Agency Abstraction Licensing Strategy (ALS)[193] information suggests that there will not be restrictions on obtaining water supplies from surface water sources.

15.4.27 Where construction highway drainage is discharged to local watercourses, assessments for determining whether routine runoff and spillage risk are likely to have a detrimental impact on water quality have been carried out using the Highways England Water Risk Assessment Tool (HEWRAT)[194]. The construction HEWRAT assessments identified no significant effects to watercourses in this area.

Groundwater

Aquifers

15.4.28 The Culcheth, Lowton and Abram cuttings in the study area will intersect the glaciolacustrine deposits Unproductive aquifer and the glacial till Secondary (Undifferentiated) aquifer. Lowton cutting may also penetrate into the Sherwood Sandstone Group (Wilmslow Sandstone Formation and Chester Formation) Principal aquifer. Whilst there may be minor localised impacts resulting from the construction of the cuttings, the implementation of measures outlined in the draft CoCP will mean that any impacts on the overall status of these aquifers will not be significant.

15.4.29 Where cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

[193] Environment Agency (2013), *Lower Mersey and Alt abstraction licencing strategy*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/300490/LIT_7881_35d3ed.pdf.

[194] Standards for Highways (2020), *Design Manual for Roads and Bridges (DMRB), LA 113 Road Drainage and the Water Environment Revision 1 (formally HD 45/09)*. Available online at: https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727.

15.4.30 The construction of the Proposed Scheme will require dewatering activities to take place, which will require approval under Protective Provisions in the Bill. The current assessment covers the dewatering activities associated with the cuttings. As well as assessing the specific impacts of these activities on potential water receptors, an evaluation of water resource policy in this area, using the Environment Agency's ALS[193], has been carried out. A review of current ALS covering the Risley to Bamfurlong area suggests that there may be restrictions on obtaining approvals for these dewatering activities, as the groundwater management unit in the Risley to Bamfurlong area is assessed as 'restricted water available' for licensed abstraction due to being over licensed. Engagement with the Environment Agency will be undertaken in relation to each of the dewatering locations. The Environment Agency will be able to impose conditions on any abstractions approved so that no significant adverse effects are likely to arise.

Abstractions

15.4.31 Lowton cutting will pass through the SPZ2 for the licensed public water supply south of Wash End. The cutting is likely to extend through the glacial till and into the Sherwood Sandstone aquifer, which is the source of water for the public supply abstraction. Although the cutting is not expected to extend below the groundwater level in the Sherwood Sandstone, there is the potential that construction activity could result in a change to water quality in the aquifer. On a precautionary basis, due to the sensitivity of public water supply boreholes to changes in water quality, this has been assessed as a moderate impact on this very high value receptor, resulting in a major adverse effect, which is significant.

Groundwater – surface water interactions

15.4.32 The assessment has not identified any temporary significant effects on groundwater – surface water interactions.

Water dependent habitats

15.4.33 The assessment has not identified any temporary hydrological impacts on water dependent habitats in the study area.

Temporary effects – Flood risk and land drainage

15.4.34 Construction of the Tributary of Holcroft Brook 2 and Tributary of Holcroft Brook 3 realignment, Holcroft Lane Brook 4 realignment, Tributary of Hey Brook 5 diversion, Hey Brook bridge, Carr Brook aqueduct, Small Brook culvert, Nan Holes Brook culvert and Coffin Lane Brook culvert will require temporary working within areas at risk of flooding. This will include the site haul routes that involve spanning these watercourses. Construction sequencing and temporary works will be designed to reduce potential flood risk to a level that is not significant. Method statements will be produced by the nominated undertaker

and subject to approvals required under the protective provisions in the Bill for the EA and LLFA[195].

Permanent effects – Water resources

15.4.35 Permanent effects are those initially caused by activity to construct the Proposed Scheme, but which will also remain after the Proposed Scheme has been constructed and is present in the area.

Surface water

15.4.36 Where highway drainage is discharged to local watercourses, assessments for determining whether routine runoff and spillage risk are likely to have a detrimental impact on water quality have been carried out using the HEWRAT[194]. These assessments have identified moderate impacts on the low value Tributary of Carr Brook 1 and Tributary of Holcroft Lane Brook 4 relating to the B5207 Wilton Lane realignment and A574 Warrington Road/Wigshaw Lane realignments respectively. These will result in minor adverse effects, which are not significant.

Groundwater

Aquifers

15.4.37 Implementation of the avoidance and mitigation measures will ensure that there are no permanent significant effects related to the impact of Culcheth, Lowton and Abram cuttings on groundwater levels and quality in the aquifers intercepted by the Proposed Scheme. Where the impacts of the cuttings on the aquifers could affect additional local receptors that rely on the groundwater resource, for example springs and abstractions, the impacts on these have been assessed and where effects are significant, they are described below.

15.4.38 Tributary of Carr Brook 1, Tributary of Holcroft Lane Brook 4 and Culcheth Linear Park Drain 1 have a low Q95 flow and may be dry at times. During these dry conditions, highways drainage discharges to these watercourses have the potential to seep into the underlying glacial till Secondary (Undifferentiated) aquifer. Therefore, HEWRAT[194] groundwater assessments have been undertaken for discharges relating to B5207 Wilton Lane realignment and A574 Warrington Road/Wigshaw Lane realignments. These assessments identified moderate impacts on this moderate value aquifer, resulting in moderate adverse effects, which are significant.

15.4.39 The assessment has not identified any permanent significant effects on groundwater or surface waters from mine water impacts from historical coal mining.

[195] High Speed Two Ltd (2022), *Phase 2b Western Leg Information Paper E15: Water resources flood risk and authorisation of related works.*

Abstractions

15.4.40 Lowton cutting will pass through the SPZ2 for the licensed public water supply abstraction (E5, SPZ2 location) south of Wash End. The cutting is likely to extend through the glacial till and into the Sherwood Sandstone aquifer, which is the source of water for the abstraction. The cutting is not expected to extend below the groundwater level in the Sherwood Sandstone, and therefore no direct impact on water quality in the abstraction is expected. However, a substantial part of the superficial deposits will be removed along the line of the cutting. The glacial till consists of layers of variable permeability and therefore could restrict vertical flow of water through the ground. The removal of the glacial till along the line of the cutting may create a direct pathway for surface water to discharge into the Sherwood Sandstone aquifer and could lead to some changes in groundwater chemistry. Since the area of the cutting is small in comparison to the SPZ for the public water supply source, the impact of this change in chemistry is assessed to be negligible, leading to a negligible effect which is not significant.

15.4.41 The Phillips Farm unlicensed abstraction is located within land required for the construction of the Proposed Scheme. The precise location of the borehole is unknown but the farm buildings which currently use this borehole will be demolished as part of the construction of the Proposed Scheme; therefore, the borehole will no longer be required. The loss of this borehole is assessed as a negligible impact, leading to a negligible effect which is not significant.

Groundwater – surface water interactions

15.4.42 The spring at West Coast Main Line (WCML) railway, 320m north-west of Aye Bridge Farm is located within the land required for the construction of the Proposed Scheme, beneath Aye Bridge embankment. The spring will be culverted beneath the route of the Proposed Scheme and discharge into Tributary of Hey Brook 5; hence the flow of the receiving watercourse is unlikely to be altered. However, this surface water feature will be permanently culverted, and the value of the feature will be reduced. The reduction in value of this feature will, therefore, result in a permanent major adverse impact on the high value receptor, leading to a major effect, which is significant.

Water dependent habitats

15.4.43 Holcroft Moss SSSI, part of the Manchester Mosses SAC, is located 44m east of the land required for the construction of the M62 West viaduct. The viaduct will be constructed with piled foundations to support piers. Glazebrook North embankment, located in the adjacent Broomedge to Glazebrook area (MA04) to the south, will also be constructed with piled foundations.

15.4.44 The decommissioning methodology will involve filling the pipeline and leaving it in place and no excavation works will be undertaken in the SSSI. Therefore, there are no anticipated effects to the integrity of Holcroft Moss.

15.4.45 At present it is unclear whether water levels in the peat at Holcroft Moss SSSI are supported by rainfall and surface water, or by a combination of rainfall/surface water and groundwater. Groundwater in superficial deposits underlying the peat may provide a flow of water into the base of the peat or may restrict the draining of groundwater from the base of the peat.

15.4.46 The groundwater flow direction in the superficial deposits is currently uncertain as there is insufficient groundwater level data available for the area. Shallow groundwater in the superficial deposits might be expected to flow from the higher elevations to the west of the Proposed Scheme, eventually draining to Glaze Brook in the east. However, groundwater flow directions in the superficial deposits will be examined through site investigation.

15.4.47 Due to the uncertainties set out above, on a precautionary basis it is assumed that Holcroft Moss SSSI is supported, at least in part, by groundwater flow. Therefore, groundwater modelling of Holcroft Moss SSSI and the surrounding area has been carried out to assess the potential impacts of the Proposed Scheme on water levels in the peat. The modelling indicates that the Proposed Scheme could lead to a decrease in groundwater levels in the peat of up to 1mm over approximately 4% of the area of Holcroft Moss, located in the southern corner of the SSSI. The reduction in groundwater levels was found to result from the presence of piling beneath Glazebrook North embankment in the adjacent Broomedge to Glazebrook area (MA04). This is assessed to be a minor adverse impact on groundwater levels within Holcroft Moss SSSI. Mitigation, in the form of a groundwater recharge trench around the toe of Glazebrook North embankment, has been included within the design. The mitigation was modelled to reduce the impact of the Proposed Scheme on groundwater levels to less than the model convergence error on the whole of Holcroft Moss. Therefore, the modelling indicates that groundwater levels across the SSSI are not affected by the viaduct with this mitigation in place. Therefore, the impact on groundwater levels within Holcroft Moss SSSI is assessed as negligible.

15.4.48 Ground investigations will be carried out in the area of Holcroft Moss during design development to refine the mitigation, with the aim of ensuring that there is no impact on groundwater levels within Holcroft Moss.

15.4.49 An HRA Screening Report and documents to inform an Appropriate Assessment have been produced for the Manchester Mosses SAC (Volume 5: Appendix EC-016-00002). The potential for hydrological impacts to result in local ecological effects is provided in Volume 5: Appendix EC-015-0MA05 Ecology register of local level effects, and for any significant effects, mitigation is identified in Volume 2, Section 7, Ecology and biodiversity.

Permanent effects – Flood risk and land drainage

15.4.50 Hydraulic modelling indicates a potential for major adverse impacts in peak flood level affecting moderate value agricultural land at Tributaries of Holcroft Lane Brook 2, 3 and 4 (see Volume 5: Appendix WR-006-00003 – Hydraulic modelling report: Tributaries of Holcroft Lane Brook), Small Brook (see Volume 5: Appendix WR-006-00004 – Hydraulic modelling report: Small Brook) and Nan Holes Brook. These result in moderate adverse effects at these watercourses, which are significant. Replacement floodplain storage is embedded into the

design on a precautionary basis to address the loss of floodplain storage caused by the Proposed Scheme. The replacement floodplain storage will be refined during design development to ensure that there is no net loss of floodplain storage and therefore no impact on flood risk elsewhere due to the Proposed Scheme.

15.4.51 Hydraulic modelling of Carr Brook (see Volume 5: Appendix WR-006-00005) indicates a potential for a major beneficial impact on peak flood levels affecting residential receptors along Brancaster Drive (high value), committed development of land for residential use MA05/092 (high value), Brancaster Drive (moderate value) and Lowton Junior and Infant School playing field (moderate value). This results in a major beneficial effects, which is significant.

Summary of significant effects

15.4.52 On a precautionary basis the Proposed Scheme is anticipated to result in the following significant effects which require other mitigation:

- a temporary major adverse effect associated with the SPZ2 for the licensed public water supply south of Wash End;
- a permanent major adverse effect on the spring at WCML railway, 320m north-west of Aye Bridge Farm;
- a permanent moderate adverse effect on water quality in the glacial till aquifer due to water quality changes from highways drainage (Tributary of Carr Brook 1);
- a permanent moderate adverse effect on water quality in the glacial till aquifer due to water quality changes from highways drainage (Tributary of Holcroft Lane Brook 4);
- a permanent moderate adverse effect on water quality in the glacial till aquifer due to water quality changes from highways drainage (Culcheth Linear Park Drain 1); and
- a permanent major beneficial effect on flood risk to local receptors due to the aqueduct and realignment of the Carr Brook.

Other mitigation measures

15.4.53 Additional mitigation measures have been developed 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.

Surface water

15.4.54 On a precautionary basis, mitigation measures are required to address the impacts of changes to highways drainage on water quality in the Tributary of Carr Brook 1 and Culcheth Linear Park Drain 1. These mitigation measures may include provision of a sediment separator, and the change of existing balancing ponds to wet ponds for retention and settlement before discharge. During the passage of the Bill further investigations, such as monitoring and analysis of the bioavailability of metals and dilution, will be carried out, where reasonably practicable, to identify whether additional mitigation measures are

required. If mitigation is required these will be designed in consultation with the Environment Agency and other stakeholders to ensure no significant adverse effect on water quality.

Groundwater

15.4.55 Mitigation options for the temporary impact on water quality at the licensed public water supply groundwater abstraction sources are being discussed with the owner (United Utilities Group plc) and the Environment Agency, with a view to ensuring a continuous, resilient water supply during the construction period. Mitigation options may include the temporary suspension of abstraction at a groundwater source, or installation of temporary treatment for the source. Until such time as a management strategy has been agreed with United Utilities Group plc a residual significant effect will remain.

15.4.56 Mitigation measures are required to address the impacts of changes to highways drainage on water quality in the glacial till Secondary (Undifferentiated) aquifer, relating to Tributary of Carr Brook 1, Tributary of Holcroft Lane Brook 4 and Culcheth Linear Park Drain 1. These mitigation measures are likely to be similar to those set out in the surface water mitigation section above. Following further investigations, the mitigation measures will be designed in consultation with the Environment Agency and other stakeholders to ensure no significant adverse effect on water quality.

Groundwater – surface water interactions

15.4.57 Mitigation options in relation to the loss of the spring at the WCML, 320m north-west of Aye Bridge Farm are being considered. Where reasonably practicable, additional measures may include re-establishing a spring near to the original location and mitigating for any adverse impacts as far as is reasonably practicable. The spring at the WCML, 320m north-west of Aye Bridge Farm will be culverted beneath the alignment of the Proposed Scheme. Any such additional measures will be designed in consultation with the Environment Agency to ensure no significant adverse effect on spring flow.

Flood risk and land drainage

15.4.58 Further work will be undertaken during design development to verify that the proposed replacement floodplain storage mitigation is adequate to fully mitigate any impacts that could lead to a significant effect on flood risk. Any refinement to the design of this mitigation will be identified and agreed with the Environment Agency, where appropriate.

Summary of likely residual significant effects

15.4.59 Implementation of the other mitigation measures described above will reduce a number of the identified effects to a level that is not significant. However, on a precautionary basis, it is anticipated that significant residual effects will remain on:

- the licensed public water supply south of Wash End. A management strategy will need to be agreed with the Environment Agency and United Utilities. Until this strategy is in place the residual effect remains; and
- a permanent major beneficial effect on flood risk to local receptors due to the realignment of Carr Brook.

Cumulative effects

15.4.60 The Proposed Scheme crosses numerous tributaries of Hey Brook, including Small Brook, tributaries of Hey Brook 1 to 6, Windy Bank Brook, Nan Holes Brook, and Coffin Lane Brook. The effects of these culvert crossings on the hydromorphology of the individual watercourses are not significant. However, the combination of these 13 watercourse crossings introduces approximately 400m of additional culverts into the Hey Brook catchment. The combined impact of these numerous culverts is assessed to be minor on the hydromorphology of the high value Hey Brook, leading to a moderate adverse effect, which is significant.

15.4.61 Mitigation options for the permanent impact on the hydromorphology of the Hey Brook catchment will be identified, discussed and agreed with the Environment Agency, in order to ensure no deterioration of the Hey Brook catchment, as far a reasonably practicable. Mitigation options could include the improvement of existing watercourse habitats or full/partial removal of existing culverts in other parts of the Hey Brook catchment. On a precautionary basis, until such time as these investigations are complete, a residual cumulative significant effect will remain.

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 is provided in Volume 5: Appendix WR-007-00000.

15.5.2 The design takes into account the policies in the NPPF and will ensure that the Proposed Scheme is safe from flooding without increasing flood risk elsewhere, as outlined in the Volume 5: Appendix WR-005-0MA05 – Flood risk assessment. Evidence of application of the Sequential Test and Exception Tests in the NPPF is provided on a route-wide basis in Volume 3.

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 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 route-wide WFD compliance assessment is provided in Volume 5: Appendix WR-001-00000. This describes how the Proposed Scheme complies with the requirements of the WFD.

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 will be no residual significant effects on surface water, groundwater or flood risk during operation of the Proposed Scheme.

Cumulative effects

15.5.8 No significant cumulative effects during operation related to water resources or flood risk are anticipated.

Monitoring

15.5.9 Volume 1, Section 9 sets out the general approach to monitoring of water resources and flood risk during operation of the Proposed Scheme.

15.5.10 There are no area-specific requirements for monitoring water resources and flood risk during operation of the Proposed Scheme.

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