E62-A

High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Technical appendices

Traffic and transport

Transport Assessment (TR-001-000) Part 1

July 2017

ES 3.5.0.16.1

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Department for Transport

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

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

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Contents

Contents

List of figures

List of tables

1 Introduction

1.1 Background

1.1.1 This Transport Assessment (TA) has been prepared on behalf of High Speed 2 Limited (HS2 Ltd) and addresses the wider transport impacts of High Speed Two (HS2) Phase 2a (also known as the Proposed Scheme). The TA also considers any combined impacts with HS2 Phase One. This introduction provides an overview of the approach adopted, which is considered in greater detail in subsequent sections.

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

1.1.3 HS2 will be built in phases. Phase One comprises the first section of the HS2 network of approximately 230km (143 miles) between London, Birmingham and the West Midlands, which will become operational in 2026. It was the subject of an Environmental Statement (ES)[1] deposited with the High Speed Rail (London – West Midlands) Bill in 2013, and subsequent ESs were deposited with Additional Provisions to that Bill in 2014 and 2015. The High Speed Two (London – West Midlands) Act received Royal Assent in February 2017 and initial works have commenced.

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

1.1.5 Phase Two will be constructed in two phases:

- Phase 2a (the Proposed Scheme): the western section of Phase Two between the West Midlands and Crewe, comprising approximately 36 miles (58km) of HS2 main line (including the section which would connect with and form the first part of Phase 2b) and two spurs (approximately 4 miles or 6km) south of Crewe that will allow trains to transfer between the HS2 main line and the WCML. Construction of the Proposed Scheme will commence in 2020, ahead of the rest of Phase Two, with operation planned to start in 2027. This is six years earlier than originally planned, bringing more of the benefits of HS2 to the north sooner; and
- Phase 2b: comprising the remainder of Phase Two, from Crewe to Manchester and from the West Midlands to Leeds. Construction of Phase 2b will commence in approximately 2023, with operation planned to start by 2033.

1.1.6 The Proposed Scheme was the subject of an Environmental Impact Assessment (EIA). The findings of this assessment are reported in an ES, of which this Transport

[1] HS2 Ltd (2013), *High Speed Rail (London - West Midlands) Environmental Statement*, https://www.gov.uk/government/collections/hs2-phase-one-environmental-statement-documents

Assessment forms a part. The Proposed Scheme will connect with Phase One at Fradley, to the north-east of Lichfield, and connect to the WCML south of Crewe, to provide onward services beyond the HS2 network, to the north-west of England and to Scotland. The Phase 2b route was announced in November 2016. When completed, the Phase 2b route will connect with Phase 2a at Crewe and form part of the western leg of the Y network extending to Manchester.

1.1.7 During construction of the Proposed Scheme, there will be potential impacts of construction activities including: movement of the workforce, construction materials and excavated materials; and the potential impacts of changes to road and non-motorised user routes - either temporarily or permanently. There may also be wider impacts due to required changes to Network Rail infrastructure and conventional rail services. Finally, the Proposed Scheme will bridge a number of waterways along the route, including the River Trent and the Trent and Mersey Canal.

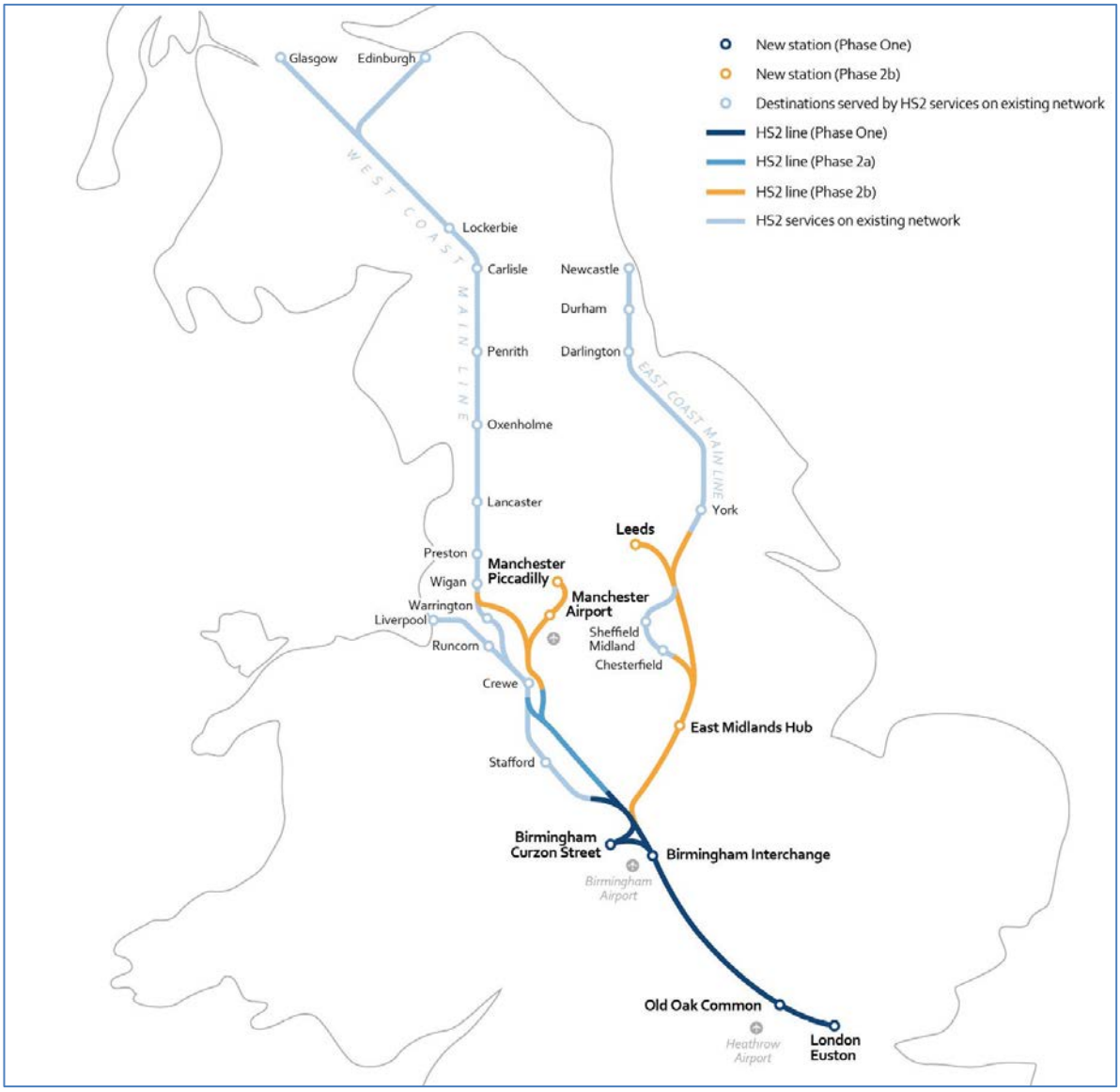
1.1.8 In operation, the main transport impacts will relate to the Infrastructure Maintenance Base – Rail (IMB-R) near Stone, the impact of infrastructure changes to existing transport networks and passengers accessing HS2 Phase One and conventional railway stations.

1.1.9 However, the nature of HS2 is that there will inevitably be wider transport impacts of its services beyond the immediate areas directly affected. For example, many of the users of HS2 will be diverted from other rail services or car or air trips. In addition, as a consequence of the introduction of HS2, train paths on the WCML will become available for use by other services (and there will be subsequent changes in demand for existing rail services). These impacts are also captured and considered in this TA.

1.1.10 The TA has been developed in accordance with the National Planning Policy Framework (NPPF)[2]. It also seeks to follow local guidance where appropriate. These are considered in more detail in the policy section (Section 2) of this TA and also in considering methodology (Section 3).

[2] Department for Transport (DCLG) (2012), *National Planning Policy Framework*, https://www.gov.uk/guidance/national-planning-policy-framework

Figure 1 : The Proposed Scheme



1.1.11 The Environmental Impact Assessment (EIA) Scope and Methodology Report (SMR)[3] and the SMR Addendum[4] for HS2 sets out the necessary topics that must be addressed in considering the environmental effects of HS2. The TA addresses all of the relevant traffic and transport topics identified in the SMR and ensures that where thresholds are set within the SMR the analysis is sufficient, as a minimum, to address all potential relevant impacts.

1.1.12 In this TA, the HS2 route has been split into sections, at a local Community Area (CA) level, as well as at a route-wide and off-route level. This ensures that all stakeholders are given a clear local picture of the likely impacts together with the adopted approach to the design of permanent way and infrastructure. This also ensures consistency with the overall ES structure. In addition, the approach reflects the

[3] *Environmental Impact Assessment Scope and Methodology Report*, Volume 5: Appendix CT-001-001
[4] *Environmental Impact Assessment Scope and Methodology Report Addendum*, Volume 5: Appendix CT-001-002

different methodologies appropriate in the different areas, particularly the urban area of Crewe and the more rural areas of Staffordshire.

1.1.13 The Proposed Scheme has been assessed for both the construction and operational stages. In both cases, the basis for the assessment assumes existing and committed development in the local area with forecast growth in population and development using appropriate methods in each area providing, in effect, a cumulative assessment. Of particular importance are HS2 construction activities and, in the operational phase, the IMB-R, changes to the highway network and the impact of changes in passenger demand at stations. For both the construction and operational assessments, where relevant, this assessment considers the combined impact of HS2 Phase 2a and HS2 Phase One. As part of the HS2 Phase One mitigation in the Fradley to Colton community area (CA1), localised temporary and permanent improvements will be required and these have been included, where applicable, in the traffic modelling assessment. These improvements include highway infrastructure upgrades to the A38 Rykneld Street/Wood End Lane (Hilliard's Cross) junction, see transport supply assumptions in section 7 for further details of HS2 Phase One related infrastructure improvements.

1.1.14 The study area focuses upon, in general, the immediate route corridor of the Proposed Scheme, including the IMB-R. In addition, consideration is given to station impacts at Crewe railway station, as well as off-route stations. The study area has been extended, where necessary, to include key roads and junctions further afield and public transport networks, where circumstances indicate impacts have the potential to be substantial.

1.1.15 During construction of the Proposed Scheme, such impacts are most likely to be the result of construction traffic and movements of excavated material to/from the wider road network. In operation, the main impacts are likely to be a result of changes to the highway infrastructure necessary to accommodate the Proposed Scheme.

1.1.16 To address both construction and operation the assessment, scenarios for the Proposed Scheme compare future baseline and the Proposed Scheme impacts for:

- construction - 2023, all impacts are considered against this single year for individual or overlapping activities regardless of timing;
- operation - 2027, opening year with Phase 2a services; and
- operation - 2041, with Phase 2a services.

1.1.17 The 2041 assessment does not consider the impact of full Phase 2b operation. This differs from the approach in the HS2 Phase One TA[5]. However, the HS2 Phase One scheme includes four stations and the design and impact of those stations required consideration of the travel demand associated with the full Phase Two scheme. Phase 2a has no stations and therefore a revised approach to assessment is appropriate.

[5] HS2 Ltd (2013), (*London - West Midlands) Environmental Statement, Volume 5: Transport Assessment* (TR-001-000), https://www.gov.uk/government/publications/hs2-phase-one-environmental-statement-volume-5-traffic-and-transport/hs2-phase-one-environmental-statement-volume-5-traffic-and-transport

1.2 Structure

1.2.1 The reporting of the assessment has been split into five CA. The TA includes transport impact details for each of the CA in order to simplify the identification of local issues. A description of the Proposed Scheme, by CA, is set out in section 6. In addition, route-wide and off-route impacts are set out separately.

1.2.2 The structure of this TA is as follows:

- Section 1 Introduction;
- Section 2 Policy and guidance;
- Section 3 Methodology;
- Section 4 Mitigation measures;
- Section 5 Baseline conditions;
- Section 6 Scheme description;
- Section 7 Fradley to Colton community area (CA1) - appraising the impact of the Proposed Scheme;
- Section 8 Colwich to Yarlet community area (CA2) - appraising the impact of the Proposed Scheme;
- Section 9 Stone and Swynnerton community area (CA3) - appraising the impact of the Proposed Scheme;
- Section 10 Whitmore Heath to Madeley community area (CA4) - appraising the impact of the Proposed Scheme;
- Section 11 South Cheshire community area (CA5) - appraising the impact of the Proposed Scheme;
- Section 12 Route-wide and off-route assessment;
- Annex A HS2 Phase 2a framework travel plan; and
- Annex B Baseline transport infrastructure and provision.

1.2.3 Background information, including baseline traffic surveys and Public Right of Way (PRoW) surveys, which were used in the assessment of traffic impacts can be found in the Background Information and Data (BID) document[6].

[6] HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Background Information and Data, Transport assessment baseline survey report*, BID-TR-001-000, www.gov.uk/hs2

2 Policy and guidance

2.1 Introduction

2.1.1 This TA has been developed in the context of national and local policy priorities and requirements. As a national scheme to be considered by Parliament through the hybrid Bill process, the most critical policies are national. However, as far as practicable, the Proposed Scheme and this TA have been developed to respect local policies and priorities.

2.1.2 This section sets out the relevant policy documents and guidance, which have been considered and taken into account in the preparation of this TA.

2.1.3 This section covers the following geographical areas:

- national policy; and
- local transport policy and guidance:
  - Staffordshire local transport policy and guidance;
  - Cheshire East local transport policy and guidance;
  - Shropshire local policy and guidance; and
  - Stoke-on-Trent local policy and guidance.

2.1.4 While international/European policy and guidance is not directly relevant, other than it being implemented in UK legislation and policy, it should be noted that the European Union (EU) has a transport infrastructure policy (2014) [7] that connects the continent between the east and west, north and south. The TEN-T policy is supported by a series of maps and documents, which identify the 'core' and 'comprehensive' network for each member state. The core network is expected to be completed by 2030 and the comprehensive network by 2050. At present, the TEN-T network maps include HS2 Phase One in the core network and HS2 Phase 2 in the comprehensive network.

2.2 National policy

The national planning policy framework (2012)

2.2.1 The NPPF promotes active management of patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.

2.2.2 Section 1 of the NPPF outlines the policies which promote economic growth. In particular, paragraph 18 states that the Government is committed to securing economic growth in order to create jobs and prosperity. Paragraph 19 further states that significant weight should be placed on the need to support economic growth through the planning system.

[7] European Union (2014), *EU Infrastructure Policy*, https://ec.europa.eu/transport/themes/infrastructure/news/ten-t-corridors_en

2.2.3 Section 4 of the NPPF outlines the policies which promote sustainable transport. Those policies which are considered of relevance to the development proposals are outlined below:

2.2.4 Paragraph 29: "transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. Smarter use of technologies can reduce the need to travel. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel".

2.2.5 Paragraph 30: "encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. In preparing local plans, local planning authorities should therefore support a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport".

2.2.6 Paragraph 31: "local authorities should work with neighbouring authorities and transport providers to develop strategies for the provision of viable infrastructure necessary to support sustainable development, including large scale facilities such as rail freight interchanges, roadside facilities for motorists or transport investment necessary to support strategies for the growth of ports, airports or other major generators of travel demand in their areas".

2.2.7 Paragraph 32: "all developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- safe and suitable access to the site can be achieved for all people; and
- improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe".

2.2.8 Paragraph 34: "Plans and decisions should ensure developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised".

2.2.9 Paragraph 35: "Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- accommodate the efficient delivery of goods and supplies; give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;

- incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- consider the needs of people with disabilities by all modes of transport".

2.2.10 Paragraph 36: "A key tool to facilitate this will be a Travel Plan. All developments which generate significant amounts of movement should be required to provide a Travel Plan".

2.2.11 Paragraph 75: "Planning policies should protect and enhance public rights of way and access. Local authorities should seek opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails".

Planning practice guidance on travel plans, transport assessments and statements

2.2.12 In March 2014, the Department for Communities and Local Government (DCLG)[8] published guidance on Travel Plans, Transport Assessments and Statements including when they are required and what they should contain.

2.2.13 However, whilst the guidance contains relevant commentary on the overarching principles of these documents and a high-level overview of what information should be included, the guidance does not contain definitive guidance on structure and methodology to be adopted in a TA. To this end, whilst this TA has been produced in accordance with these guiding principles, the Department for Transport (DfT) Guidance on Transport Assessments (DfT, 2007[9]) has also been used to guide the structure and methodology.

DfT guidance on transport assessments (2007)

2.2.14 In 2007, DfT published 'Guidance on Transport Assessments'. This guidance was not a statement of government policy and it was recommended, therein, that the guidance should be considered in conjunction with, and in the context of, national transport policy.

2.2.15 The publication was withdrawn on 22 October 2014, and was superseded by 'Transport evidence bases in plan making'. This document focuses primarily on providing guidance to help local planning authorities assess and reflect strategic transport needs in local plan making. This is therefore not directly relevant to specifically assessing the impact of a proposed development. However, the guidance includes principles which are applicable to this TA, in particular the requirement to collate suitable baseline information to inform a TA and the subsequent assessment of the capacity of transport infrastructure and its ability to meet forecast demands.

2.2.16 Although the 2007 document is now withdrawn, aspects of the guidance remain relevant in providing advice on the types of assessment that should be undertaken,

[8] Department for Communities and Local Government (2014), *Travel Plans, Transport Assessments and Statements*, https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements
[9] Department for Transport (2007), *Guidance on Transport Assessment*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263054/guidance-transport-assessment.pdf

based on the scale of the proposed development and, accordingly, the methodology and approach that should be adopted.

2.2.17 In the case of the proposed HS2 Proposed Scheme, the DfT's guidance has been used in the preparation of the TA. The key aspects of the guidance in the context of the TA include:

- engaging with the relevant stakeholders;
- establishing the existing conditions, as part of the baseline for the assessment;
- reducing the need to travel, especially by car and promoting sustainable access; and
- dealing with residual trips and setting out appropriate mitigation measures.

DfT single department plan (2015 - 2020)

2.2.18 The DfT single department plan (2015 - 2020)[10] sets out a firm commitment to HS2 and high speed rail, stating that the DfT will roll out a national high speed rail network with long term investment of up to £55.7 billion (2015 prices) to deliver HS2: Phase One by 2026, Phase 2a by 2027 and the rest of the network by 2033.

2.2.19 It notes the role of HS2 in rebalancing the national economy, helping to bring together cities across the north. It is stated that this will increase productivity, attract private sector investment and create new jobs and opportunities. In this regard, the scale of the HS2 project is noted as creating supply chain opportunities across the country.

2.2.20 The role of HS2 in increasing capacity on the rail network and ensuring that the national transport system is reliable is also noted. This will help to provide greater resilience to network incidents and weather events.

2.2.21 Potential efficiencies are noted with a commitment to embed a programme of initiatives to provide savings in HS2, including the use of off-site fabrication in the construction phase.

HS2 Plus – a report by David Higgins (2014)

2.2.22 This report by David Higgins (chairman of HS2 Ltd)[11] set out the initial case for bringing forward the delivery of HS2 Phase 2 to Crewe by 2027 (six years earlier than planned). It argued that this would bring the wider benefits of HS2 to the north of England much sooner. As well as delivering the benefits of HS2 to the north six years earlier, the report also argues that the earlier a decision is taken to accelerate HS2 services to Crewe, the more cost savings can be achieved.

[10] Department for Transport (2016), *Single Departmental Plan 2015 to 2020*, https://www.gov.uk/government/publications/dft-single-departmental-plan-2015-to-2020

[11] David Higgins/Department for Transport (2014), *HS2 Plus*, http://assets.hs2.org.uk/sites/default/files/inserts/Higgins%20Report%20-%20HS2%20Plus.pdf

2.2.23 It also set out the regional benefits of the accelerated route to Crewe, with potential benefits to surrounding areas including Chester, Winsford, Manchester Airport, Stoke, Lichfield, Wolverhampton and Shrewsbury.

Rebalancing Britain – from HS2 towards a national transport strategy (2014)

2.2.24 The second report by David Higgins[12] sets out his vision for HS2 and how it would enable city regions to realise their potential, with transport as a key driver for the knowledge economy.

2.2.25 The report recommends that both the eastern and western legs of Phase 2 are needed in order to deliver the strategic reductions in journey time and additional capacity required. It also confirms the preference for services to Crewe to be in place by 2027, allowing surrounding areas such as the North West, North Wales and Merseyside to benefit from HS2 sooner.

2.2.26 The report also sets a challenge to identify lessons from elsewhere in the world in order to build Phase 2 more quickly and at a lower cost through the use of new design and construction techniques.

High Speed Two: east and west – the next steps to Crewe and beyond (2015)

2.2.27 This document by the DfT[13] confirms a decision by the Secretary of State that powers for Phase 2a should be sought through a separate hybrid Bill to Phase 2b in order to allow it to be opened in 2027. It confirms that DfT considers that accelerating this section of Phase 2 will improve journey times to northern cities sooner, support growth and jobs in the local area, and help to create conditions supportive of both the Northern Powerhouse and the Midlands Engine. It notes that DfT has considered a number of options in arriving at this conclusion.

2.2.28 The document also confirms the route of Phase 2a, based upon the proposals put forward for consultation in 2013, but with a number of refinements as a result of the consultation process.

Highways England

2.2.29 Highways England (formerly the Highways Agency) is responsible for managing, operating and developing the motorway and 'trunk road' network in England. In 2015, Highways England published The Strategic Road Network - Planning for the Future[14], as a guide to engaging and working with Highways England on planning matters and the planning process.

[12] HS2 Ltd (2014), *Rebalancing Britain: From HS2 towards a national transport strategy*, https://www.gov.uk/government/publications/rebalancing-britain-from-hs2-towards-a-national-transport-strategy
[13] Department for Transport and HS2 Ltd (2015), *HS2 Phase Two: east and west, the next steps to Crewe and beyond*, https://www.gov.uk/government/publications/hs2-phase-two-east-and-west-the-next-steps-to-crewe-and-beyond
[14] Highways England (2015), *The Strategic Road Network - Planning for the Future*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/461023/N150227_-_Highways_England_Planning_Document_FINAL-lo.pdf

2.2.30 The guide is written in the context of the current Government's, at the time of writing, policy and previous guidance (including Circular 02/2013[15] which set out Highways England's approach to development which could impact upon their strategic road network (SRN), and superseded the previous Circular 02/2007 Planning and the SRN[16], and the Highways Agency's Circular – The Highways Agency and the Planning Application Process - A Protocol for the Handling of Planning Applications)[17].

2.2.31 The guide sets out Highways England's approach to planning, explains their position, and provides guidance and clarity on the matters that Highways England shall have regard to, and what they are likely to find acceptable and unacceptable, to help shape proposals and ensure that they are sustainable.

2.2.32 It is stated that Highways England will support economic growth, providing the conditions that help businesses to succeed and grow, facilitating new development around the network, and supporting investment and trade. This will take place alongside maintaining a safe and efficient SRN. The document sets out how Highways England, along with those working on their behalf, will work with development promoters to help assess and successfully manage the relationship between proposed development and the SRN.

2.2.33 In this guide, Highways England encourages all parties promoting and preparing plans or applications that could have an impact on the SRN to engage with them as early as possible to help ensure that issues that may take time to analyse and resolve are identified as soon as possible.

2.2.34 In the case of this TA for HS2 Phase 2a, consideration has been given as to what impact HS2 Phase 2a will have on the SRN. As part of the TA scoping process and ongoing assessment, engagement has taken place with Highways England.

Road investment strategy

2.2.35 The first Road Investment Strategy (RIS 1) was published by the DfT and Highways England in 2014[18] and is the first step in a long-term vision to improve Highways England's motorways and major roads. RIS1 covers the period 2015-2020, committing to £15 billion of investment in over 100 major schemes to enhance, renew and improve the SRN over the next five years. A project of specific relevance to the study area in this document includes the M6 SMART Motorway scheme at the M6 junctions 13 - 15, to include hard shoulder running, which will significantly increase the capacity of the M6 at peak periods.

2.2.36 RIS 2 will develop this long-term vision further post 2020, with the period up until this point to include a research phase and the updating of key strategic studies.

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[15] Department for Transport (2013), *Circular 02/2013,* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/237412/dft-circular-strategic-road.pdf

[16] Department for Transport (2007), *Planning and the Strategic Road Network*, http://webarchive.nationalarchives.gov.uk/+/dft.gov.uk/pgr/regional/strategy/policy/circular207planningandstrategic.html

[17] Highways Agency (2014), *The Highways Agency and the Planning Application Process - A Protocol for the Handling of Planning Applications*, http://assets.highways.gov.uk/specialist-information/guidance-and-best-practice-regional-planning/Protocol%20for%20Dealing%20with%20Planning%20Applications%20v2%201%20-%20June%2014.pdf

[18] Department for Transport and Highways Agency (2014), *Road investment strategy: 2015 to 2020*, https://www.gov.uk/government/collections/road-investment-strategy

Network Rail

2.2.37 Network Rail's (NR) overall position on HS2 is summarised by the following statements:

- "High Speed Two (HS2) will provide a major capacity and connectivity boost for Britain's railway"[19]; and
- "When the new high speed rail network completes it will not only transform rail connectivity in Britain it will also provide the step-change in capacity needed to deliver major improvements for existing rail users"[20].

2.2.38 As part of its long term planning process, NR's Route Utilisation Studies (RUS)[21] seek to balance rail supply and demand and set out a longer term vision for improvements across the rail network, identifying 'gaps' (defined as "what the system can currently supply in terms of infrastructure and train services and what is likely to be demanded of the system now and in the future for passenger and freight services at suitable levels of performance") and 'options', together with priorities for rail investment.

2.2.39 The WCML RUS[22], with a plan period of thirty years, was published in July 2011 and identifies gaps and sets out priorities for rail investment along this part of the network to accommodate the expected numbers of passengers and volumes of freight. To do this, it considers a number of options, including running longer trains, more long distance trains at off-peak times, faster services between Birmingham and Manchester and some additional fast commuter services into London. It also supports the need to develop capacity for freight. However, it notes that the WCML will "effectively be full" by 2024.

2.2.40 The WCML RUS notes that HS2 would provide significant additional capacity on the WCML corridor, addressing gaps identified in the RUS, improving regional links, supporting national economic competitiveness and reducing carbon emissions by encouraging more people to shift from roads and air to rail, with the following extracts from the RUS particularly relevant to HS2:

- "The RUS, therefore, supports the development of the proposed new high speed line, initially between London and the West Midlands and then onwards to Manchester and beyond."
- "The proposed new line [HS2] would operate long distance services and would release significant capacity on the classic network which can be utilised by both passenger and freight services. This would relieve the substantial overcrowding that is forecast on commuter services, as well as relieving the pressure on long distance capacity."

[19] Network Rail (2013), *Better Connections - Options for the integration of High Speed 2*
[20] Network Rail (2017), *Our Upgrade Plan, High-speed rail*, http://www.networkrail.co.uk/improvements/high-speed-rail/
[21] Network Rail (2012), *Route Utilisation Strategies,* http://archive.nr.co.uk/browseDirectory.aspx?root=&dir=%5cRUS%20Documents%5cRoute%20Utilisation%20Strategies
[22] Network Rail (2011), *West Coast Main Line. Route Utilisation Strategy*, http://archive.nr.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/west%20coast%20main%20line/westcoastmainlinerus.pdf

2.2.41 NR is working closely alongside CEC, HS2 Ltd and the DfT to develop the 'Crewe Hub' proposal, which aims to provide more capacity, better connectivity, more resilience and improved access to and facilities at the station. The benefits of Crewe Hub are outlined in the report 'Crewe Hub – improving capacity and connectivity for our customers', November 2016[23]. It is important to note that Crewe Hub does not form part of the Proposed Scheme.

2.3 Local planning and transport policy

2.3.1 Staffordshire County Council (SCC) and Cheshire East Council (CEC) are the key local highway and transport authorities for the Proposed Scheme. Local planning and transport planning policies and guidance for these authorities have been reviewed. A summary of relevant current and emerging local planning and transport planning policies and guidance (including any locally available guidance on transport assessments) in Staffordshire and Cheshire East are presented below. In addition, construction traffic is expected to use parts of Stoke-on-Trent and Shropshire's highway networks and as such relevant local plan policies in these areas have also been reviewed and summarised.

Staffordshire local transport and planning policy and guidance

2.3.2 Staffordshire comprises eight local planning authorities, with the Proposed Scheme impacting on (both in terms of operation and construction) Lichfield District Council (LDC), Stafford Borough Council (SBC) and Newcastle-under-Lyme Borough Council (NBC). SCC acts as highway authority for the entire county.

2.3.3 This section considers relevant transport policies produced by SCC in their role as local highway authority and relevant planning policies produced by LDC and SBC as local planning authorities. Stoke-on-Trent City Council and NBC are currently developing a draft local plan which is also considered.

Staffordshire local transport plan 2011 – strategy plan

2.3.4 The Staffordshire Local Transport Plan (LTP)[24] sets out a number of policies under seven key areas, including growth and regeneration, highway maintenance, ease of use, safety and security, emissions, health and quality of life and environment. There are no HS2 stations planned in Staffordshire, therefore the relevant aspects of the plan relate to longer-distance national and local travel and the environment.

2.3.5 The plan states that the county has excellent access to national and international transport networks. The plan recognises that the county's geographical location and excellent connectivity has contributed towards inward investment. However, inadequate connections to Manchester Airport are recognised, and the plan calls for improved public transport links to Manchester Airport from the north of the county.

[23] Network Rail (2016), *Crewe Hub – improving capacity and connectivity for our customers'*, https://www.networkrail.co.uk/wp-content/uploads/2016/11/Crewe-Hub-improving-capacity-and-connectivity-for-our-customers.pdf
[24] Staffordshire County Council (2011), *Staffordshire Local Transport Plan 2011,* https://www.staffordshire.gov.uk/transport/transportplanning/localtransportplan/staffordshirelocaltransportplan2011strategyplan.pdf

2.3.6 With regards to the impact of transport on the environment, the plan sets out a number of policies that are relevant, including promoting alternatives to private motor vehicles (Policy 5.1) and reducing emissions from road transport (Policy 7.1).

Lichfield District local plan strategy (2008 – 2029)

2.3.7 LDC is a local planning authority in Staffordshire. SCC is responsible for transportation across the county.

2.3.8 The Local Plan Strategy 2008 - 2029[25] was adopted in February 2015. The strategy sets out that LDC aim to deliver a minimum of 10,030 dwellings in this period. In relation to employment, the strategy aims to promote greater opportunities for high value employment in the district, including higher wage opportunities in growth sectors related to business, education and research. Full consideration of this planned growth has been included in this TA as appropriate.

2.3.9 The strategy recognises the need for supporting infrastructure to ensure that this development is sustainable. For example, Strategic Priority 5 sets out that growth should be directed "towards existing sustainable urban and rural settlements and by increasing the opportunities for travel using sustainable forms of transport by securing improvements to public transport, walking and cycling infrastructure".

2.3.10 There are a number of specific references to HS2 including reference with regards to one of the Strategic Development Allocations for Lichfield City (Policy Lichfield 5: East of Lichfield (Streethay). It is stated that this development will need to ensure that the impacts of the route of HS2 on the new development are taken into account and mitigated for accordingly.

2.3.11 Further reference to HS2 Phase One is made with regards to Whittington. The route of the HS2 Phase One scheme runs to the west of the village and the plan notes that measures will need to be supported which minimise the impacts of this upon the community and the environment.

The plan for Stafford Borough (2011 – 2031)

2.3.12 SBC is a local planning authority in Staffordshire.

2.3.13 The plan for SBC[26] proposes that 10,000 new homes will be provided between 2011 and 2031, as well as 160 hectares of employment growth. Consideration of this planned growth has been included in this TA as appropriate.

2.3.14 The plan also defines a series of key objectives which could be considered to align to the benefits that HS2 will bring to the borough. For example, objective five aims to provide employment land which can "attract new research and development facilities as well as growth opportunities to provide new businesses for graduate employment and inward investment to diversify the economy".

[25] Lichfield District Council (2015), *The Local Plan Strategy. 2008 – 2029,* https://www.lichfielddc.gov.uk/Council/Planning/The-local-plan-and-planning-policy/Resource-centre/Local-Plan-documents/Downloads/Local-Plan-Strategy/Lichfield-District-Local-Plan-Strategy-2008-2029.pdf
[26] Stafford Borough Council (2014), *The Plan for Stafford Borough,* http://www.staffordbc.gov.uk/theplanforstaffordborough

2.3.15 The spatial vision also sets out that by 2031, "the County Town of Stafford will have an enhanced national and regional profile through major new housing and employment developments as the Growth Point, supported by a range of new infrastructure provision".

2.3.16 The objectives and overarching strategy of the plan clearly align with the implementation of further infrastructure provision such as HS2 and will facilitate growth across the borough, specifically in locations around Stafford station and the town centre.

2.3.17 There are two policies set out in the Plan relating directly to transport. Policy T1 sets out the main principles for delivering sustainable transport across the Borough. Policy T2 provides detailed matters to be addressed when delivering specific development proposals.

2.3.18 Relevant aspects of Policy T1 include the requirement for new developments to produce TAs and Travel Plans, where appropriate, including maximising the use of public transport.

2.3.19 Policy T2 relates to parking and manoeuvring. Since no HS2 stations or parking facilities are proposed in Stafford, it is not considered relevant to the Proposed Scheme.

Newcastle-under-Lyme Borough Council and City of Stoke-on-Trent local transport policy and guidance

Newcastle-under-Lyme Borough Council and City of Stoke-on-Trent core strategy and joint local plan

2.3.20 The core strategy recognises its role alongside the Staffordshire LTP and North Staffordshire LTP to create a spatial plan which "makes provision for and maintains a modern accessible transportation system, which supports opportunities for walking and cycling in safe and attractive environments and successfully connects communities to each other and links them to modern labour markets and high performing local services and facilities". The Staffordshire LTP is described earlier in this section and the North Staffordshire LTP has since been superseded by the Stoke-on-Trent LTP 2011/12 to 2025/26.

2.3.21 The existing core strategy (2006 - 2026)[27] was adopted in 2009 and outlined target growth of approximately 11,700 dwellings in Stoke-on-Trent and 5,700 in Newcastle over the core strategy period. Employment growth of 11ha per annum and 5.6ha for Stoke-on-Trent and Newcastle respectively was also targeted. Consideration of this planned growth has been accounted for in this TA as appropriate.

2.3.22 Stoke-on-Trent City Council and NBC are preparing a new joint local plan that will eventually replace the existing joint core spatial strategy (2009). A draft local plan will be prepared in 2017, with adoption targeted for the end of 2018.

[27] Newcastle-under-Lyme and Stoke-on-Trent (2009), *Core Spatial Strategy 2006 - 2026*, https://www.stoke.gov.uk/directory_record/331810/adopted_core_spatial_strategy_2009

2.3.23 The joint local plan issues consultation undertaken in 2016 included a technical paper on transport which outlines the potential of HS2 as a strength, in terms of providing opportunities for improving national connectivity, improved regional passenger services and freight services.

Stoke-on-Trent: local transport plan (2011/12 - 2025/26)

2.3.24 The Stoke-on-Trent LTP[28] summarises a number of transport policies outlined in the core strategy with a specific emphasis on how these relate to the LTP. These are summarised as follows:

- improving accessibility and social inclusion;
- maximise the potential of new residential, employment, retail, development, health and education centres, green open space, leisure and sport facilities as well as strategic transport interchanges, such as railway stations, by walking, cycling and public transport;
- where necessary allocating land for the provision of essential infrastructure;
- promoting travel awareness and encouraging the production of Green Travel Plans and the latest information and communication technologies;
- increase the safety of travel by ensuring that developments adopt design principles which work to create safer environments and where appropriate by delivering infrastructure improvements with new development;
- progressive development of Park and Ride facilities;
- encouraging the use of waterways as lines of communication and enhancing and safeguarding rail travel;
- addressing the environmental impacts of travel including congestion, air quality and noise pollution; and
- secure developer contributions towards the delivery of schemes that support the key objectives of the Staffordshire and North Staffordshire LTPs.

Cheshire East local transport policy and guidance

2.3.25 CEC is a unitary authority which acts as the local highway authority and local planning authority.

2.3.26 Prior to the formation of CEC, the area was structured as several local planning authorities with Cheshire County Council acting as local highway authority. As such, local planning policies were developed for Congleton, Crewe and Nantwich and Macclesfield. CEC is yet to formally adopt a local plan, it is currently under consideration by the Inspector, therefore the Congleton, Crewe and Nantwich and Macclesfield local plan policies are currently saved.

[28] Stoke-on-Trent (2011), *Draft Local Transport Plan,* https://apps2.staffordshire.gov.uk/scc/TrimDocProvider/?ID=13/162

2.3.27 This section sets out details of relevant transport policies produced by CEC since its formation and a summary of the current position regarding local plan policies.

Cheshire East local transport plan (2011 – 2026)

2.3.28 The LTP[29] recognises the role of the borough's national and international road, rail and air transport links in supporting its ambition to be a premier location for business growth and an attractive place to live. The stated priorities of the Cheshire East LTP are to "ensure a sustainable future" and "create conditions for business growth". Future investment in transport will be directed towards the policies and interventions which support these priority areas to help grow the economy and tackle carbon emissions.

2.3.29 In each of these priority areas a number of 'core' priority policies are identified. In relation to ensuring a sustainable future, relevant priority policies include working with passenger transport providers (including rail) to improve public transport integration and facilities (Priority Policy S3).

2.3.30 In relation to business growth, relevant priority policies include working with neighbouring authorities, regional/sub-regional organisations, public transport operators and providers to enhance cross-boundary and strategic investment opportunities in transport (Priority Policy B1) and enabling development through the use of supporting transport infrastructure (Priority Policy B2).

Cheshire East local plan strategy

2.3.31 A local plan for Cheshire East is currently being prepared and will guide development up to 2030. The plan will set planning policies and allocate sites for development and be the statutory development plan for Cheshire East. Prior to the adoption of documents in the new local plan, saved policies from previous local plans of authorities in Cheshire East will continue to be used. These include the Congleton Borough Local Plan and the Borough of Crewe and Nantwich Local Plan, both of which are affected by the Proposed Scheme either in terms of operation or construction.

2.3.32 The local plan strategy is one of the key documents that make up the local plan and sets out the overall vision and planning strategy for development in the borough. It also identifies strategic sites and strategic locations that will accommodate most of the new development needed.

2.3.33 The local plan strategy contains four strategic priorities as follows:

- promoting economic prosperity by creating conditions for business growth;
- creating sustainable communities, where all members are able to contribute and where all the infrastructure required to support the community is provided;

[29] Cheshire East Council (undated), *Local Transport Plan Final Strategy (2011 - 2026)*, http://www.cheshireeast.gov.uk/public_transport/local_transport_plan/local_transport_plan.aspx

- protecting and enhancing environmental quality of the built and natural environment; and
- reducing the need to travel, managing car use and promoting more sustainable modes of transport and improving the road network.

2.3.34 In relation to "promoting economic prosperity by creating conditions for business growth", specific reference is made to "capitalising on the accessibility of the Borough, including improved transport links with the Manchester City Region and Manchester Airport, improved transport infrastructure such as Crewe Railway Station; and maximising the opportunities that may be offered by HS2". It also notes that HS2 will have significant benefits for the borough and the sub-region.

2.3.35 The Local Plan Strategy also anticipates that HS2 will be decisive in supporting the case for significant future growth and development in the southern part of the borough, centred around Crewe, Alsager, Congleton and Middlewich.

2.3.36 There is also a specific section of the local plan strategy related to HS2. It is noted that HS2 will support existing businesses, inward investment and job creation through enhanced connectivity to Crewe. CEC supports the economic benefits of HS2 but will look to minimise its environmental impacts.

Congleton Borough local plan (saved policies)

2.3.37 Prior to the formation of CEC, Congleton Borough Council produced a local plan (adopted 2005)[30], which remains as saved policies until the formal adoption of the Cheshire East Local Plan.

2.3.38 The Congleton Local Plan contains policies and proposals for the area previously covered by Congleton Borough covering the period to 2011. It was adopted on 27th January 2005. A number of policies from the local plan have now been saved to form part of the local development framework.

2.3.39 Policy GR11 relates to proposals for the provision of transportation projects. It states that proposals will only be permitted if they would improve the transport network of the plan area. A number of further criteria are set out including:

- discouraging non-essential vehicle traffic and on-street parking within towns and villages;
- improving safety and movement of traffic and highway users;
- improving the safety and freedom of movement of pedestrians and cyclists;
- providing improved access to industrial, business and commercial areas;
- enhancing or supporting the public transport system and;
- reducing noise, congestion and atmospheric pollution in residential areas and areas of high pedestrian activity.

[30] Congleton Borough Council, (2005), *Local Plan*, http://www.cheshireeast.gov.uk/planning/spatial_planning/saved_and_other_policies/congleton_local_plan/congleton_local_plan.aspx

2.3.40 Consideration of the planned growth, identified in the Plan, has been accounted for in this TA as appropriate.

Borough of Crewe and Nantwich local plan (saved policies)

2.3.41 Prior to the formation of CEC, the borough of Crewe and Nantwich produced a local plan (adopted 2005)[31], which remains as saved policies until the formal adoption of the Cheshire East Local Plan.

2.3.42 The Borough of Crewe and Nantwich Replacement Local Plan was adopted on 17th February 2005 and covers the period up to 2011. A number of policies from the local plan have now been saved to form part of the local development framework.

2.3.43 The plan recognises that Crewe Station is a "Gateway" to the north-west and a vital interchange for rail users, both by connections within the station and as a strategic interchange serving Cheshire and North Staffordshire. The remainder of the plan is focussed on development sites in the plan area and does not relate specifically to HS2 or strategic rail access. Consideration of the planned growth identified within these development sites has been accounted for in this TA as appropriate.

Shropshire County Council

2.3.44 SCC is a unitary authority which acts as local highway authority and local planning authority for the area.

Shropshire local development framework: core strategy

2.3.45 The core strategy[32] sets out the Council's vision, strategic objectives and the broad spatial strategy to guide future development and growth in Shropshire during the period between 2011 and 2026. The strategy outlines that provision for new housing and employment land across Shropshire, including the potential provision of 26,125 - 28,875 dwellings and 265 – 315ha of employment land in total across the various spatial zones. Consideration of this planned growth has been accounted for in this TA as appropriate.

2.3.46 Policy CS7: Communications and Transport sets out that "a sustainable pattern of development requires the maintenance and improvement of integrated, accessible, attractive, safe and reliable communication and transport infrastructure and services". Among others, the policy sets out that this can be achieved through "promoting rail related developments to support the sub-regional role of Shrewsbury and the role of Market Towns and other rail linked centres and increasing choice of destinations and service improvements". Whilst the policy does not specifically reference HS2, Shrewsbury has direct rail connections to Birmingham, which would therefore allow connection onto the HS2 network.

[31] Borough of Crewe and Nantwich (2005), *Replacement Local Plan 2011*, http://www.cheshireeast.gov.uk/planning/spatial_planning/saved_and_other_policies/crewe_and_nantwich_local_plan/crewe_and_nantwich_local_plan.aspx

[32] Shropshire Council (2011), *Core Strategy 200 6- 2026*, http://shropshire.gov.uk/planning-policy/local-plan/core-strategy-2006-2026

3 Methodology

3.1 Introduction

3.1.1 This section sets out the overarching route-wide methodology and assumptions adopted in the preparation of the TA for the Proposed Scheme. Where the methodology or assumptions vary between areas, these are discussed in the CA sections as appropriate.

3.1.2 The TA presents an assessment of the impacts of the Proposed Scheme on all transport users, including non-motorised users, road users and public transport passengers. The Proposed Scheme has been assessed for both construction and operation.

3.1.3 HS2 Phase One commenced construction in 2017 and will be operational in 2026. Consequently, there is potential for a six year period during which both construction of Phase One and the Proposed Scheme are under way and affecting traffic conditions in the Fradley to Colton area. To reflect this, the main assessment has included the predicted traffic associated with the HS2 Phase One construction stage as part of the future baseline. In addition, a further assessment of the Proposed Scheme in the Fradley to Colton area includes consideration of any cumulative construction impacts of HS2 Phase One and the Proposed Scheme compared to a future baseline without either.

3.1.4 The operational analysis includes an assessment of the impact of HS2 Phase 2a services assuming HS2 Phase One is already in operation and also the cumulative impact of HS2 Phase One and Phase 2a services compared to a baseline without HS2.

3.1.5 The construction assessment also includes consideration of the potential increase in construction traffic that could arise as a result of the overlap in construction programme between the Proposed Scheme and the proposed Crewe Hub. The Crewe Hub proposal is at an early stage of development and there is insufficient information on which to base a robust assessment of in-combination construction effects. Nevertheless, an indicative assessment of the combined construction impacts of the Proposed Scheme and the Crewe Hub proposal has been undertaken, recognising the potential that the latter proceeds at the same time as the Proposed Scheme.

3.1.6 The future baseline includes demand from existing and committed development in the areas local to the Proposed Scheme, with future growth taken either from local planning projections and models or from the DfT's transport forecasting Trip End Model Presentation Program (TEMPro). These include wider growth and proposed development that has not yet been approved but which is included in the local plans or TEMPro.

3.1.7 The traffic and transport impacts of the Proposed Scheme have been assessed as appropriate through a combination of strategic and detailed modelling exercises, together with more direct assessments of impacts (such as diversion of PRoW), as appropriate. The specific approaches taken vary according to the characteristics of the section of the route and the nature of the impact (e.g. whether impacts are expected during the construction and/or operational phases).

3.1.8 The modelling and assessment work ensures that the impacts of the construction and operation of the Proposed Scheme are duly considered, inclusive of:

- informing the engineering design of the Proposed Scheme for both the construction and operational phases of the project;
- providing substantive analysis for the TA;
- establishing the likely impact and possible traffic and transport mitigation required;
- supporting the ES process including the provision of traffic data to inform other assessments; and
- informing engagement with highway authorities and other stakeholders throughout the passage of the Bill.

3.1.9 The modelling and assessment work undertaken for the TA is robust because it:

- was undertaken respecting applicable guidance;
- used appropriate and suitably robust tools, taking the variety of demand generation and responses into account as appropriate;
- has been subject to appropriate quality assurance checks; and
- used an objective methodology to reach conclusions.

3.1.10 Where highway assignment modelling has been undertaken using models owned by the respective highway authorities, they have been used, updated and enhanced in cooperation with them. Each highway assignment model has been reviewed, with the models and the modelling process considered fit for purpose.

3.1.11 A TA scoping exercise was undertaken with relevant highway authorities (SCC, CEC and Highways England) to facilitate a consistent approach in each section and comparable assessments along the whole route.

3.2 Reporting approach

3.2.1 The TA is generally reported by CA, which broadly follow parish and county boundary areas to ensure that the assessment can be clearly understood by all stakeholders, to be consistent with the ES and to allow the different methodologies followed in different areas (e.g. Staffordshire and Cheshire East) to be reported appropriately.

3.3 Areas of consideration and key impacts

3.3.1 Respecting guidance, the following topics were considered in the assessment of the construction and operational stages of the Proposed Scheme:

- local land uses;
- traffic surveys;
- highway network – strategic/local road networks and all road users;

- accident and safety analysis;
- parking and loading;
- public transport – rail services, local bus services and public transport interchanges;
- pedestrians, cyclists and equestrians (non-motorised users) – PRoW, pedestrian and cycle networks;
- taxis (the South Cheshire area only); and
- waterways/canals.

3.3.2 It should be noted that as there are no airports in the five CA, this report does not include any further commentary on air transport.

3.3.3 In addition, whilst public transport services are considered, the assessment does not include direct impacts upon school and community bus services, coaches and taxis (except in the South Cheshire area). Similarly, emergency services are not separately considered. These topics are not considered individually because they are either subject to demand responsive changes to routes or operate no differently to general traffic. Therefore, the impacts on these modes are captured as part of the TA. The only exception to this is how taxis are likely to be impacted in terms of parking at Crewe Station. However emergency service vehicles, when operating under blue light conditions, are able to circumvent other road traffic including queuing traffic and general traffic congestion, utilising manoeuvres they currently undertake.

3.3.4 The following key traffic and transport changes brought about by the Proposed Scheme have been assessed:

- road layouts, road closures/diversions/widening/alterations (including stopping and passing places), junction changes and diversions of PRoW;
- traffic, public transport, pedestrian and cyclist flows;
- access to properties and places of work (where this is not dealt with directly by the Proposed Scheme design);
- journey times and journey distances for users of private and commercial vehicles;
- bus routes and stop locations;
- accessibility, journey times, distances or frequencies for stations, interchanges and changes to public transport infrastructure;
- parking and servicing; and
- journey times and distances, and changes in amenity and ambience for non-motorised road users and waterway users.

3.4 Engagement with relevant parties

3.4.1 A number of stakeholder organisations were consulted during the development of the methodology adopted for the TA. These included local highway authorities (SCC and CEC) and Highways England.

3.4.2 Through a series of meetings, discussions and scoping review, the methodology was developed for the preparation of the TA which identified the most appropriate approach to the modelling of the impacts of the Proposed Scheme in different areas.

3.4.3 An extensive consultation exercise was undertaken in September and October 2016. The Working Draft Environmental Impact Assessment (WDEIA) consultation was undertaken on an interim design of the Proposed Scheme. Key stakeholders and members of the public subsequently provided feedback on the scheme proposals. Many of these responses have informed the design development of the Proposed Scheme, which continued with due consideration of concerns and issues raised during the consultation events.

3.4.4 The TA assesses the traffic and transport impacts wherever they are expected to arise without a fixed geographic scope. The study area was discussed with relevant parties and includes locations further afield where impacts could potentially be significant.

3.5 Assessment scenarios

3.5.1 The following scenarios were used to assess the Proposed Scheme:

- baseline - 2016;
- future baseline - 2023, 2027 and 2041 (to inform the construction and operational assessments);
- construction - compared to a future baseline of 2023 (this has been adopted as a common baseline assessment year for construction impacts);
- operation - 2027 (opening year of the Proposed Scheme); and
- operation - 2041 (consistent with the HS2 Phase One assessment) with HS2 Phase 2a infrastructure and services.

Crewe hub

3.5.2 Additional analysis has also been undertaken to examine the construction impacts of the proposed Crewe Hub development on the local transport infrastructure. At this time, the proposals for Crewe Hub are limited to a preferred location at the existing Crewe Station, which does not provide adequate information on which a robust assessment can be based. No environmental assessment has been undertaken for the proposed Crewe Hub to inform this cumulative construction assessment. However, as the aspiration is to have Crewe Hub operational in line with the year of opening (2027) of the Proposed Scheme, there is the potential for construction activity associated with the Proposed Scheme and the Crewe Hub proposal to overlap. The additional analysis provides a basis for considering an indicative cumulative impact of the two schemes during construction.

Baseline - 2016

3.5.3 A summary of the baseline survey information which was collected to inform the assessment for both this TA and the ES is provided in Section 5, with summary data contained in the baseline survey report (see BID-TR-001-000).The baseline survey report includes a review of traffic survey data, PRoW survey data, accident data and outputs from relevant transport models.

3.5.4 Section 5 includes a commentary on the existing transport network in terms of roads, public transport, pedestrian, cycle, equestrian and waterways/canals, as well as critical links and junctions on the existing highway and public transport networks, as appropriate. Local conditions at locations where the Proposed Scheme can be expected to have an impact are reported.

Future baseline - 2023, 2027 and 2041

3.5.5 Future baseline scenarios for 2023, 2027 and 2041 were determined using growth factors for population and development forecasts based on recognised good practice sources that are generally used for this purpose by planning and transport authorities. In addition, committed and planned developments and committed transport schemes were taken into account, as appropriate, where of particular relevance to the assessment.

Construction - 2023

3.5.6 The construction assessment considers peak individual construction traffic activity at each location whenever it may occur, in conjunction with 2023 future baseline demands. This provides a consistent basis on which to compare and assess construction impacts across the entire Proposed Scheme. Where construction routes serve more than one construction compound, the combined vehicle movements during the busiest period for each section of each route have been assessed.

3.5.7 The construction transport impact assessment addresses the following time periods:

- weekday AM peak hour (08:00 – 09:00); and
- weekday PM peak hour (17:00 – 18:00).

3.5.8 The weekday AM and PM peak hours have been selected for analysis as these represent the time periods with the highest background traffic volumes and higher levels of congestion on the highway network, when combining both future baseline and Proposed Scheme construction traffic.

Operation - 2027 and 2041

3.5.9 The operational assessment years are 2027, as the opening year of the Proposed Scheme, and 2041, which is consistent with the HS2 Phase One assessment and is year 14 after opening. Both operational assessments assume the expected traffic generation of the Proposed Scheme (Phase 2a infrastructure with Phase 2a HS2 services in operation) for the relevant year overlaid on the future baseline flows. As with the construction assessment, the weekday AM and PM peak hours have been assessed.

3.6 Data collection

3.6.1 The TA scoping discussions undertaken with highways authorities covered the identification of the data required for the TA. This considered both existing data and new data to be collected as part of the TA.

3.6.2 Primary data has been collected for traffic and non-motorised users to establish a baseline for existing conditions. Section 5 and the baseline survey report (see BID-TR-001-000) provides information on the types of surveys undertaken and the results.

3.6.3 Existing data has also been obtained from transport authorities and the DfT, including count data and accident data in the possession of local transport authorities. In addition traffic models, outputs from traffic models including growth rates, as well as signal timing data has also been obtained.

3.7 Background traffic growth

3.7.1 The Proposed Scheme was assessed for both construction and operation. As outlined above, assessments of operation include assessment of the Proposed Scheme in 2027 and 2041. The assessment assumes future traffic growth based on future likely development in the areas local to the Proposed Scheme, including both committed and those identified in local plans or TEMPro, even where uncommitted.

3.7.2 In the more rural areas, traffic growth factors were directly obtained from TEMPro[33] version 7.0 which uses the most up to date versions of the National Trip End Model (NTEM 7.0) dataset and the National Transport Model (NTM) 2015. NTEM datasets are long term forecasts, representing the DfT's best estimate of long-term response to demographic and economic trends. The latest version of TEMPro has been updated with economic data based on recent Gross Domestic Product (GDP) forecasts. The NTM traffic forecasts take account of forecast changes in fuel costs and changes in trip length over time, which are not included in NTEM.

3.7.3 TEMPro inherently incorporates future planned development irrespective of whether it is approved, committed, or simply included in approved plans. It includes all economic and population growth forecasts, and assumes growth in housing and commercial development, therefore providing a prediction of traffic growth by area. However, there is no explicit assumption concerning which particular developments do or do not go ahead in the derivation of TEMPro planning data. Consequently, a review of committed development has been undertaken as part of this TA that has identified, where possible, specific developments in close proximity to the Proposed Scheme that could be given explicit consideration in the quantification of background traffic growth.

[33] TEMPro – Trip End Model Presentation Programme. The software used to generate traffic growth rates based upon the National Trip End Model (NTEM) forecasts

3.7.4 The identification of specific developments in proximity to the Proposed Scheme respected DfT Guidance on Transport Assessments (2007) and involved:

- a desk-top review of relevant local planning policy emerging from Local Development Frameworks and local plans;
- review of planning applications within 1km of the centreline of the Proposed Scheme; and
- engagement with local authorities to identify specific committed developments for consideration.

3.7.5 Traffic generation from committed developments has only been added to background traffic growth where it is likely to have a direct impact on the transport impacts of the Proposed Scheme and is not adequately reflected in the background traffic growth from local development already assumed by TEMPro or local traffic models. This minimises the extent of double counting in the traffic growth forecasts.

3.7.6 In the Crewe area, the Crewe SATURN model rather than TEMPro forecasts has been used to derive growth rates. Along the M6 corridor between junctions 14 - 16 and parts of Stafford, growth rates in local traffic models[34] have been compared with TEMPro data and found to be generally higher. In such instances, forecast growth rates have been based on the traffic models. Such models incorporate future year assessment scenarios that take into account growth forecasts using planning data from a variety of sources including local plans and are generally constrained to TEMPro, but provide a greater degree of disaggregation and should more accurately reflect local circumstances.

3.8 Proposed Scheme trip generation and distribution

Construction

3.8.1 Construction related trips include worker trips to and from construction compounds, together with construction vehicles transporting excavated and construction materials. Trip generation estimates have been calculated by considering the following, as appropriate:

- identification of the number of worker/person trips travelling to/from a site on a daily basis for the identified assessment periods exclusive of travel plan impacts;
- assumptions for modal splits for construction workers to/from the site;
- assumptions for vehicle occupancies for cars/vans; and
- identification of the number of construction vehicles (including heavy goods vehicles (HGV)) travelling to/from a site on a daily basis for the identified assessment periods.

[34] Local traffic models defined as Crewe, Stafford or M6 junctions 13 - 15 SATURN models described in further detail within the modelling approach section below

3.8.2 The distribution and assignment of construction trips were determined taking the following into account, as appropriate:

- likely catchment areas for construction workers;
- assumptions regarding construction traffic (HGV) routing, in particular the expected requirement for and generation of excavated materials; and
- the potential matches between surpluses and deficit of materials within the Proposed Scheme that can reduce external traffic movements.

3.8.3 The construction assessment considers the average flow in the peak month of construction traffic activity. This provides a consistent and 'maximum most likely' basis against which to compare and assess construction impacts across the entire route. Where construction sites are in close proximity, in-combination impacts of construction traffic from the various sites have been assessed.

3.8.4 The most intensive periods for construction traffic are generally related to the movement of excavated materials related to, for example, excavation of cuttings or tunnels or construction of earthworks. These larger movements will be along prescribed construction traffic routes. At other times, for sites that involve such movements, construction traffic levels are generally substantially lower. There will also be lower levels of traffic involved in site set up when daily average combined two-way vehicle trips will typically be in the range of 30-40 for cars/Light Goods Vehicles (LGV) and 20 - 80 for HGV. Site set up will have a duration of one to three months. During site set up, main compounds will generally be accessed via the primary road network and will generate traffic volumes at the higher end of this range. Satellite compounds, will in some instances, be accessed via unclassified roads, but these will generate traffic volumes at the lower end of this range.

Operation

3.8.5 The main operational trip generation will arise from a combination of changes in rail passenger demand at stations and activity associated with the IMB-R. The IMB-R will be a permanent maintenance base situated between the Proposed Scheme and the M6 near Stone. The facility will operate as a base for maintenance activities to support HS2 railway infrastructure. There will also be traffic associated with general maintenance of the route. However, this will be infrequent and consequently it has not been considered further in the assessment.

3.8.6 With regard to rail passenger demand, there are no HS2 stations included in HS2 Phase 2a. However, the Proposed Scheme will result in changes in passenger demand at Crewe Station and other existing off-route railway stations. These changes in passenger demand are informed by the PLANET model assessment, which is described in more detail in Section 3.10. The PLANET model predicts weekday daily (16-hour working day) total passenger demand at off-route stations. Assumptions are then used to determine peak hour use of different access modes at off-route stations. The detailed methodology is reported in the route-wide and off-route assessment (Section 12).

3.8.7 Trip generation associated with the IMB-R is largely outside of the peak periods. It has been calculated using the following approach:

- forecasts of total daily and peak period trip generations for the identified assessment years related to staff, deliveries and visitors;
- all staff travelling to and from the IMB-R are assumed to travel by private car;
- single vehicle occupancy is assumed for all vehicles; and
- profiles of movements, across a typical working day, have been determined for cars, LGV and HGV.

3.9 Construction assessment assumptions

Construction vehicles

3.9.1 Each 'design' element of the Proposed Scheme has been assigned to a construction compound along the route and the transport related trip generation calculated. The quantities of materials required to construct each element of the Proposed Scheme, the volumes of fill required or excavated material to be removed, together with the equipment necessary for construction of each element, were identified as part of the design process.

3.9.2 The quantities of materials and equipment have been converted to vehicle loads using typical vehicle payloads, in terms of either weight or volume, depending on which of these represents the maximum payload capacity constraint for the material being delivered. The total number of construction vehicles forecast to be generated by each compound has been calculated by adding together the forecast number of vehicles estimated to be generated by each 'design' element assigned to any one compound.

3.9.3 The proposed construction programme identifies when each 'design' element of the Proposed Scheme is forecast to be constructed. This has enabled the number of vehicles generated per day over the construction duration to be calculated for each compound. From this, the average trip generation per day for each compound was calculated for each month of construction activity and over the whole construction duration for that compound, assuming an average of 20 working days per month. It has been assumed that 10% of the daily deliveries of construction material and equipment occur during the morning peak hour (08:00 - 09:00) and 10% during the evening peak hour (17:00 - 18:00).

3.9.4 Vehicle trips generated by deliveries of construction materials and equipment were assigned to the proposed HGV routes linking the construction compounds to the SRN by a GIS road network model. The HGV routes have been reviewed using professional judgement, based on both desk top and site observations to select the most suitable routes.

Construction workforce

3.9.5 The forecast size of the workforce required at each construction compound per month over the construction programme was estimated on a monthly basis from the construction activities associated with each 'design' element assigned to each compound.

3.9.6 The assessment is based on all workers travelling from home each day, which will provide a worst case robust assessment. However, the provision of designated accommodation within the larger compounds will reduce the impact of worker travel compared to the levels assessed in the TA.

3.9.7 The working hours during the week for the majority of construction compounds will be 08:00 - 18:00 and 08:00 - 13:00 on Saturdays in line with the Draft Code of Construction Practice (CoCP) [35]. HS2 Ltd will require its contractors to adhere to these core working hours for each site, as far as reasonably practicable or unless otherwise permitted. For tunnelling and other works, there will be 24-hour working with shift working, which will generally substantially reduce peak period workforce travel.

3.9.8 The approach distinguishes construction worker and staff trips. The daily car trips generated by each construction compound are based on the estimated staff and workers at each compound. All staff are assumed to travel to work by car with single car occupancy. Two thirds of workers are assumed to travel by car and one third by LGV, with a combined average occupancy of 1.33. This results in an average occupancy of 1.27 for staff and workers combined.

3.9.9 In addition, there are inter-compound LGV movements, with LGV traveling to adjacent compounds and returning during the working day along the road network.

3.9.10 With the assumed 08:00 to 18:00 (10-hour day) typical shift pattern, the TA has assumed that 50% of workers' car and LGV arrival trips plus 10% of the inter-compound LGV trips will occur in the AM peak (08:00 - 09:00). For the PM peak (17:00 - 18:00) it is assumed that 50% of workers' car and LGV departure trips plus 10% of the inter-compound LGV trips will occur.

3.9.11 A gravity model has been used, using 2011 census data, to determine the likely locations that the workforce will come from, in order to assign the trips generated by the construction workforce to the road and public transport networks, taking account of the accessibility by road and public transport of each construction compound.

3.9.12 A construction workforce travel plan will be implemented covering each compound, which will seek to reduce the overall vehicle trip generation, especially during the morning and evening peak periods. This is explained in more detail later in this section. The proposed framework is included in Annex A. However, the workforce trip generation methodology described above does not take account of this and consequently traffic impacts may be overstated.

Excavated materials

3.9.13 The Proposed Scheme design identifies when excavated material needs to be moved to or from a location. The Proposed Scheme design identifies where there is forecast to be either a surplus or shortfall of material along the route, as well as the most practical and efficient approach to re-using excess excavated material in locations where there is a shortfall. It also identifies the quantity of excavated material that

[35] *Draft Code of Construction Practice*, Volume 5: Appendix CT-003-000

needs to be moved by road because it is not practical to move it by any other means, e.g. by rail or via a site haul road along the route.

3.9.14 The quantity of material to be moved has been converted to vehicle loads using typical vehicle payloads. These are taken into account in the assessments for each CA. A contingency has been made for inclement weather conditions during the winter period which could result in reduced earthworks productivity. As such, for the period November to February it has been assumed that earthworks activity is reduced by 50%. This is factored into the construction programme and does not result in an increase in activity during the non-winter period.

3.9.15 This has enabled the number of vehicle trips generated per month to be calculated for each location. It has been assumed that material will be moved at a constant rate per 10-hour weekday and per month over the required period during the construction programme. The trip rate per hour over the day is therefore 1/10th (10%) of the daily trip rate. No allowance has been made for working Saturday.

3.9.16 The origins and destinations of HGV trips moving excess excavated material by road have been identified. The vehicle trips generated by the movement of excavated material have generally been assigned to the shortest route between identified origins and destinations via the proposed construction traffic routes and the SRN. Where material will not be reused as part of the Proposed Scheme, it is assumed that this will take the shortest route to the nearest junction on the SRN (the M6 or A38 (T)).

3.9.17 Where excavated material is moved by road from one compound to another, the movements are assessed both in relation to the origin compound and the destination, regardless of which CA the origin and destination are located in.

Borrow pits

3.9.18 The Proposed Scheme will require high quality aggregate (usually comprising sand and gravel) to construct railway embankments[36]. This material will be provided, in part, through excavation of cuttings and other works (for example, tunnels or balancing ponds) along the route of the Proposed Scheme, where the quality is appropriate. However, at some locations along the route there is anticipated to be a shortfall of high quality material for use in railway embankment construction.

3.9.19 Obtaining material from commercial quarries would have required the transportation of the high quality material by HGV, which would have resulted in impacts on the local road network and communities. These movements would have also necessitated the widening of local roads and associated junction improvements to accommodate HGV. Under this option, clays extracted during construction of the Proposed Scheme would have to be transported off-site, increasing HGV movements and again leading to impacts on the local road network and communities.

[36] The sands and gravels extracted from the borrow pits are intended for constructing the Proposed Scheme railway embankments. However, if the properties of the materials extracted are suitable, it may also be used to make concrete or other cement bound materials for construction of the Proposed Scheme

3.9.20 Excavating borrow pits will enable high quality aggregate to be extracted and processed locally and transported largely on site haul routes within the construction area of the Proposed Scheme. This option will generate lower HGV movements than importing the material from commercial quarries, reducing impacts on the local road network and communities. Using borrow pits will remove a significant number of HGV movements from the highway network. Reducing the amount of HGVs also reduces the need to widen roads and improve junctions, further reducing environmental impacts.

3.9.21 The borrow pits created during excavation will be backfilled with materials generated from the construction of the Proposed Scheme, typically clay, that does not have suitable characteristics for use as railway embankment fill. This presents a more sustainable option, reducing the need to move the extracted clay off-site, further helping to limit impacts on the local road network and communities. For these reasons, borrow pits were taken forward as the preferred option in the Proposed Scheme.

3.9.22 Six borrow pits have been included in the design of Proposed Scheme, four in the Fradley to Colton area, one in the Whitmore Heath to Madeley area and one in the South Cheshire area They are located within the land temporarily required for construction of the Proposed Scheme to reduce the need for material to be moved on local roads.

3.10 Modelling approach

3.10.1 The traffic and transport impacts of the Proposed Scheme were assessed as appropriate using relevant models, together with more direct assessments of impacts (such as for diversion of PRoW). The specific approaches taken vary according to the different sections of the route and the nature of the impact, as appropriate. Urban areas, such as Crewe and Stafford, have generally been assessed using different methods to more rural areas. This is largely due to the complexity of the highway networks in these areas and also the availability of existing traffic assignment models. For example, both Stafford and Crewe have SATURN models containing future year growth and highway network assumptions, whereas rural areas do not typically have this existing information available.

3.10.2 The following outlines the high-level modelling approach used to assess the Proposed Scheme. Detail of the approach used is provided in each of the CA sections to account for local circumstances.

Modelling framework

3.10.3 The key modelling elements are as follows:

- estimates of the trip generation and changes to travel patterns, as a result of the Proposed Scheme in both construction and operation;
- sources of estimates of the baseline and future baseline travel demands in the area of the Proposed Scheme for both highways and public transport as necessary;

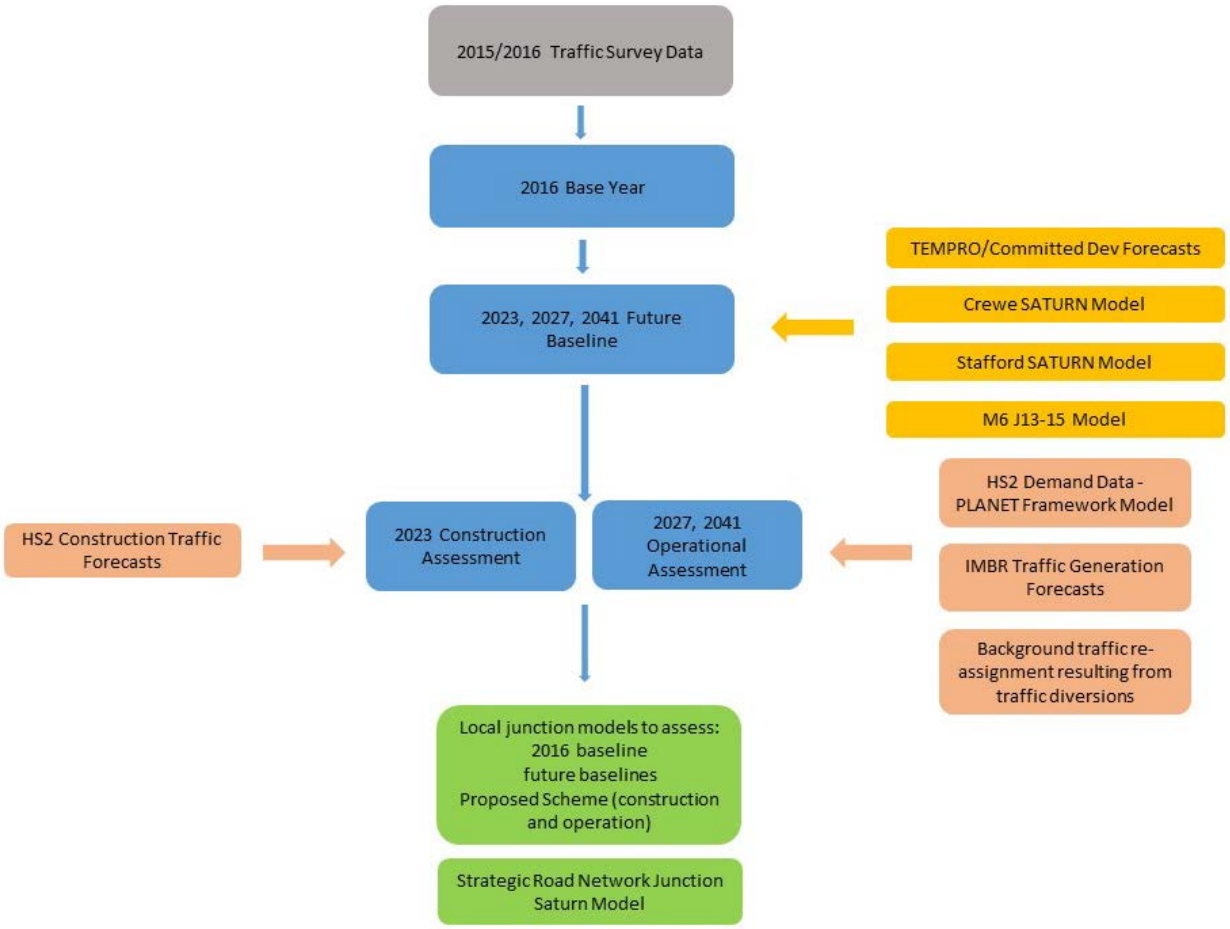
- identification of network changes (HS2- and non HS2-related) and resultant impact on traffic;
- establish the detailed travel patterns for future baseline and the future baseline with the Proposed Scheme, using modelling tools as relevant; and
- as necessary, detailed modelling tools to investigate impacts.

3.10.4 The models and data sources that have been used can be summarised as:

- strategic long distance rail demand modelling for both future baseline and the changes resulting from the Proposed Scheme:
  - the PLANET Framework of Models (PFM) - PLANET Long Distance, PLANET Midland, PLANET South, PLANET North and the PLANET Station Choice Model (SCM);
- local highway assignment modelling to provide future baseline traffic flows and changes to the local highway networks (applied in the urban areas of Crewe and Stafford and along the M6 corridor):
  - within Crewe use of updated 2023, 2027 and 2041 versions of the Crewe SATURN model; and
  - use of existing Stafford SATURN model and the M6 Smart Motorway Programme (SMP) junctions 13 - 15 model (for relevant baseline flows and future baseline growth rates);
- local traffic growth forecasts and baseline traffic counts:
  - in country and more rural areas, baseline traffic counts, TEMPro and committed development have been used to generate future baseline traffic flows;
- construction and operational traffic demands and changes as a result of the Proposed Scheme; and
- local junction capacity modelling to assess the impact of the Proposed Scheme on the capacity of the local road networks:
  - local junction modelling using traffic analysis software packages including Junctions 9 and LINSIG.

3.10.5 Figure 2 illustrates the overarching approach to transport modelling to inform the HS2 Phase 2a assessment.

Figure 2: Modelling framework



PLANET

3.10.6 The PFM is the DfT's forecasting model, which has been used to develop rail demand forecasts as a result of the Proposed Scheme. PFM is the most appropriate modelling tool to be used in terms of forecasting the demand of the Proposed Scheme given its strategic capability, covering all long-distance rail, car and air movements across England, Scotland and Wales.

3.10.7 The PFM has been further developed by HS2 Ltd from a suite of models originally developed by the DfT and Strategic Rail Authority (SRA). PFM has evolved over a number of years, and builds on existing model components. Its aim is to provide forecasts of demand and (generalised) costs to drive the appraisal of HS2. As is standard in transport modelling, 'generalised cost' is a combination of monetary costs and travel time components.

3.10.8 In addition to modelling the HS2 scheme, the DfT has used PFM to assess the strategic alternatives to HS2. Versions of PLANET have previously been used by the SRA and the DfT to support the SRA high speed lines study, the Eddington Review, and the Thameslink business case.

3.10.9 The PFM has been developed with an extensive quality assurance (QA) approach undertaken consistent with the DfT guidance. This has included extensive developer QA, peer reviews and independent implementation audit.

3.10.10 The PFM demand forecasts are based on the latest outline service specifications, which are consistent with the HS2 Ltd Business and Economic Cases[37]. As part of the HS2 Phase 2a assessment the PLANET model has been updated since the HS2 Phase One assessment. The version used is PFMv7.1.

3.10.11 The key elements of the forecasting process may be described as follows:

- derivation of base year (2014/2015) demand patterns for rail and road;
- growth of base year demand to future year(south); and
- demand response to changes in the provision of future rail services, including both new High Speed Rail services and/or changes to rail services on the existing network.

3.10.12 It may be expected that demand for HS2 services will be a mixture of demand transferring from other modes and additional ('generated') demand. This means that PFM needs to represent the supply and demand for those other modes, which may transfer to HS2. Thus within PFM different types of models cover different geographic areas and markets:

- The PLD, providing the long-distance demand for rail, air and car;
- SCM, providing boardings and alightings at individual stations in the areas covered by PS, PM and PN; and
- PS, PM and PN - regional rail only models used to model local rail journeys providing the shorter distance rail demand with these regions.

3.10.13 The PFM provides an overall 'framework' linking the components above in a consistent way. The PFM is conventional in the sense that it contains a multi-modal supply representation based on networks, together with a multi-modal demand model, which is segmented by different types of travel and responds to changes in generalised cost.

3.10.14 PFM takes into account a wide range of impacts on travel behaviour such as journey time, train service frequency, interchange (both between modes and within modes), crowding and station access/egress times. In the integrated framework, the interaction between long distance and local demand is represented.

3.10.15 Apart from the service characteristics, no special recognition is given to HS2 services. The choice between HS2 and conventional rail services is made as part of the general route choice in the PLD rail assignment model. The introduction of HS2 leads to improvements for rail in general, thus increasing overall demand for rail.

3.10.16 The PFM provides rail, HS2 demand forecasts and air/car long distance impacts. Practically speaking, PFM is exogenous to the TA modelling, supplying outputs to inform the route-wide and off-route assessments.

[37] Department for Transport and HS2 Ltd (2015), *HS2 Phase 2a: economic case*, https://www.gov.uk/government/publications/hs2-phase-2a-economic-case

3.10.17 The PLANET model has been run for the future baseline, HS2 Phase One and the Proposed Scheme. As part of the TA, off-route impacts derived from PLANET have been considered for both the Proposed Scheme with HS2 Phase One in the baseline and for HS2 Phase One and the Proposed Scheme with neither in the baseline.

Local highway assignment models

3.10.18 The Crewe SATURN model has been updated and further refined on behalf of CEC by JACOBS (CEC's framework consultants), both to inform this TA and other CEC and NR regeneration projects in the Crewe Station area (including Crewe Hub), with new zones added to better reflect trips to and from the existing Crewe Station area. New 2023 and 2027 future baseline model years have been developed to provide future baseline background traffic volumes, whilst the existing 2041 model has been further refined in the vicinity of Crewe Station.

3.10.19 The Crewe model has been calibrated and validated to Design Manual Roads and Bridges (DMRB) criteria. The DMRB target for specific criteria such as link volumes and journey times is for 85% of links to be within set limits[38]. Table 1 shows the model correlation between observed and modelled data for link performance against specific criteria including, where applicable, link volumes, junction turning volumes, screen-line volumes and journey times. Where there is a difference between the AM and PM peaks and GEH statistics[39] and volumes Table 1 reports the lowest correlation values.

3.10.20 Highways England's M6 SMP junction 13 - 15 model has been used to provide traffic growth for the future baseline along the M6 corridor between junctions 14 - 16 for the years 2027 and 2041. In agreement with Highways England, the 2020 model has been used as a proxy for 2023 to assess the impact of construction traffic on the M6 motorway infrastructure. Section 5 of the TA, baseline conditions, reports on the M6 junction performance for junctions 14 - 16 using the SATURN model. Results for junctions 14, 15 and 16 are extracted directly from the SATURN model.

3.10.21 The Stafford SATURN model has been used to generate forecast growth rates and provide forecast future baseline traffic flows in areas where the Stafford Model growth rates have been assessed and shown to be higher than TEMPro. These are in areas with large developments planned, such as the housing developments planned to the east of the A513 Beaconside. This results in the use of the model to determine traffic growth along parts of the A513 Beaconside, the A518 Weston Road and Tixall Road.

3.10.22 Table 1 provides a summary description of all three highway assignment models that have been used to inform the traffic impact assessments.

[38] Highways Agency (1996), *DMRB Volume 12, Section 2, Part 1 Traffic Appraisal in Urban Areas, Table 4.2 Assignment Validation: Acceptability Guidelines*

[39] GEH Statistic is used to validate modelled flows against observed and is a form of the Chi-squared statistic that incorporates both relative and absolute errors. GEH are the initials of its inventor. Atkins (2017) SATURN Manual

Table 1 Highway assignment traffic models

Model	Ownership	Software	Base Year	Forecast Years	Time Periods	Calibration	Validation
Crewe	CEC	SATURN	2013	2017, 2023, 2032 and 2041	08:00 – 09:00 10:00 – 16:00 Average 17:00 – 18:00	Links – 81% Turns – n/a Screenlines – 86%	Links – 85% Screenlines –33% Journey times - 86%
M6 SMP Junctions 13 - 15	Highways England	SATURN	2012	2020, 2035 and 2041	07:00 – 09:00 10:00 – 16:00 Average 16:00 – 18:00	Links – 90% Turns – n/a Screenlines – 100%	Links – 100% Screenlines – 40% Journey times – 80%
Stafford	SCC	SATURN	2007	2018, 2025 and 2032	08:00 – 09:00 17:00 – 18:00	Links – 85% Turns – 82% Screenlines – 85%	Links – 83% Screenlines – n/a Journey times – 86%

3.10.23 Table 1 indicates that all three models show good correlation between observed and modelled traffic data in excess of 80% for each criteria, except for the screenline validation in the Crewe and M6 models. For the Crewe model, traffic flows across some screenlines[40] in rural areas are substantially lower than those in urban areas, making the % difference criteria harder to meet. However, all screenlines (100%) fall within the GEH criteria[39], which take into account low traffic volumes. The M6 SMP junctions 13 - 15 model is a strategic model and the model performance at some distance from the core model area, which includes screenlines, does not correlate as well as the validation along or in close proximity to the M6 motorway corridor. The M6 link validation is 100% and this study has only used this model to assess impacts on the M6. All three models are considered fit for purpose.

3.10.24 Importantly, all of the demand models, including TEMPro, are driven by comparable data sources for population, employment and economic activity. As the assessment moves from the macro UK wide forecasts to the micro local level, more specific local estimates of development are used.

Construction and operational traffic demands

3.10.25 The changes to travel demands arising from the Proposed Scheme are established through:

- in construction, the estimates of travel generation relate to the scale, rate and type of construction activity and the expected workforce numbers;
- in operation, the estimates of travel generation for workforce and the IMB-R are based upon expected levels of workforce and activity; and

[40] Screenlines are lines drawn through a modelled area. The observed traffic counts on roads which pass through a screenline are compared against modelled flows used for the calibration and validation of a model

- in operation, for passenger demands, application of the outputs from the PLANET model together with regional and local estimates of access modes and distribution of origins and destinations.

Local junction capacity modelling

3.10.26 Local junction capacity modelling has been undertaken at junctions, which will be substantially impacted by the Proposed Scheme during construction and operation. In identifying junctions for modelling assessment, consideration has been given to the following construction impacts:

- increase in traffic volumes on the SRN, primary and local road networks, as a result of construction activities; and
- temporary road closures and diversions.

3.10.27 The following operational impacts have been assessed:

- permanent changes to the highway infrastructure to accommodate the Proposed Scheme, resulting in various road diversions and realignments and new junction arrangements and configurations;
- changes in passenger demand at Crewe Station and at off-route stations, in particular capturing the impact on the local road network of those passengers arriving and exiting the station via car mode; and
- traffic generated by the IMB-R including employee, servicing and visitor trips.

3.10.28 The Proposed Scheme includes embedded mitigation including extensive enabling works. Where enabling infrastructure is scheduled to be in place in advance of the major construction, the modelling assessment has accounted for such improvements. Consequently, the traffic modelling assessment includes the HS2 Phase One related infrastructure improvement to the A38 Rykneld Street/Hilliard's Cross junction.

3.10.29 Software used to access local junction capacity comprises Junctions 9 for all priority controlled junctions within the study area and LINSIG for all signal controlled junctions.

3.10.30 The baseline junction traffic demands have been derived from observed turning counts at junctions and the traffic models and have been validated to observed queue length surveys (QLS). To ensure a robust assessment, where two or more surveys at the same location differ, the approach has been to use the survey with the highest traffic volumes. In several instances ATC surveys have higher baseline flows than the equivalent MCC survey. In such instances the appropriate turning volumes have been adjusted to reflect the higher volumes.

3.10.31 All local junction models have traffic flow inputs in passenger car units (PCUs), in order to represent the observed composition of vehicles in the traffic flow. Queue length outputs from the model are also presented in PCUs. Typically, a car will represent one PCC, whereas a HGV will be between two to three PCUs depending on the length of HGV included in the junction modelling assessment.

4 Mitigation measures

4.1 Introduction

4.1.1 The overarching aim of the mitigation strategy is to reduce the Proposed Scheme traffic and transport impacts and effects, during construction and operation, on local communities, local infrastructure and the environment. A comprehensive mitigation strategy has been developed that addresses all of these aspects, where appropriate. There are three major strands to the approach to mitigation as follows:

- embedded mitigation;
- the Draft CoCP; and
- the framework travel plan (FTP).

4.1.2 Each element is discussed in more detail in this section.

4.2 Embedded mitigation

4.2.1 Mitigation proposals have been included in the Proposed Scheme design and construction methodology, where appropriate and reasonably practicable, in order to 'design out' adverse impacts, both for construction and operation. The TA has therefore been progressed alongside the design process and mitigation proposals have become an integral part of the design to minimise adverse impacts at an early stage, so far as reasonably practicable.

4.2.2 The embedded mitigation includes various transport measures including but not limited to:

- new highways (roads and PRoW) will be constructed and operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
- the majority of roads crossing the route of the Proposed Scheme will be maintained or locally diverted during construction to limit the need for diversions of traffic onto alternative routes;
- 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 PRoW will be provided during construction, insofar as reasonably practicable, where either the existing or final proposed route is not available;
- insofar as reasonably practicable, site haul routes will be created adjacent to the route of the Proposed Scheme to transport construction materials and equipment to reduce HGV movements on public roads with access taken via the main road network;

- HGV will be routed, insofar as reasonably practicable, along the strategic and/or primary road network;
- insofar as reasonably practicable, the use of the local road network will 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;
- a temporary railhead will be provided near to Stone in the Stone and Swynnerton area to allow construction materials, including excavated materials and equipment, to be transported by the existing rail network. The temporary railhead will include direct access to and from the M6, which will reduce HGV movements on the local road network;
- the reuse of excavated material, insofar as reasonably practicable, along the route of the Proposed Scheme;
- borrow pits in the Fradley to Colton area, Whitmore Heath to Madeley area and South Cheshire area will enable the volume of construction traffic on the road network to be reduced;
- highway measures including junction improvements, passing places and carriageway widening will be provided, as required, to manage the safe passing of construction vehicles on construction HGV routes. These are considered in this assessment and ES Volume 4, Off-route effects;
- the Draft CoCP includes the requirement to develop local traffic management plans, which will consider the local traffic management strategy including consideration of sensitive receptors, such that the effect on safety and accidents is not significant; and
- on-site welfare facilities will be provided to reduce daily travel by site workers.

4.2.3 Consideration has been given to the provision of further mitigation measures within the relevant section of the TA, with assessment of these as appropriate and necessary.

4.2.4 For necessary off-site mitigation, the general approach has been to identify an indicative, feasible and effective option that would address the mitigation need. It is expected that further detailed discussions would take place with local highway authorities. In most instances, rather than detailed prescriptive design options, this TA recognises that off-site interventions should be considered in the context of wider objectives of local authorities and through subsequent dialogue, an improved mitigation plan may be developed. In some locations however, specific highway works are proposed that will address constraints on highway users (such as inadequate road width to allow safe passing of HGV). These will reduce any potential highway impacts.

4.2.5 Where adverse impacts are predicted to occur at some distance from the Proposed Scheme, this has been assessed in the TA. The need for off-site mitigation has been considered and potential mitigation measures have been assessed, where appropriate. Such measures may include improved pedestrian or cycle facilities, revised bus stop arrangements and junction modifications such as traffic signal

changes. The general approach will be to facilitate improved access by sustainable modes.

4.3 Draft Code of Construction Practice (CoCP)

4.3.1 A Draft CoCP (see Volume 5: Appendix CT-003-000) has been developed which contains control measures and the standards to be implemented throughout the construction of the Proposed Scheme.

4.3.2 In particular, the Draft CoCP sets out various mitigation measures to reduce the impact of construction traffic which have been included in the construction transport assessments, including:

- excavated material will be reused, where reasonably practicable, along the alignment of the Proposed Scheme, which will reduce the effects of construction vehicles on public roads;
- use of internal haul routes for construction vehicles to minimise the need to use public roads; and
- agreed routes for construction (HGV) vehicles, keeping to the main road network (e.g. motorways, trunk roads and primary 'A' roads) where reasonably practicable.

4.3.3 In addition, the Draft CoCP assumes the following controls on construction material and workforce travel, although assumptions have been taken for the demand profile of construction trips, as outlined in Section 3, to assess a 'maximum reasonably likely' demand scenario:

- core site operating hours will be 08:00 - 18:00 on weekdays and 08:00 - 13:00 on Saturdays and site staff and workers will therefore generally arrive before the morning peak hour and depart after the evening peak hour;
- where reasonably practicable, the number of private car trips to and from the site (both workforce and visitors) will be reduced by encouraging alternative modes of transport or vehicle sharing; and
- some workers will be resident at accommodation sites reducing the need to travel.

4.3.4 The Draft CoCP states that traffic management measures and plans will be prepared in consultation with local highway authorities during the detailed design process. HS2 Ltd will continue to work with the relevant highway authorities and key stakeholders to manage impacts. Generic measures, which will apply route-wide, will be discussed in advance with the local highway authorities and any other appropriate authorities. Prior to the commencement of the works, the nominated undertaker will ensure that a route-wide traffic management plan (RTMP) will be produced in consultation with the highway and traffic authorities, the emergency services and other relevant key stakeholders.

4.4 Framework travel plan

4.4.1 An overarching FTP has been produced that requires travel plans to be used along with a range of associated potential measures to mitigate the impact of transport associated with construction, maintenance and operation of the Proposed Scheme, in particular by reducing commuting by single occupancy car and encouraging use of sustainable transport. The scope of this includes:

- a construction workforce travel plan – the framework will inform site specific plans that will be required to be produced and in particular to reduce workforce commuting by private car, especially sole occupancy car travel. Where practicable, this will also encourage the use of sustainable modes of transport;
- operation of a new IMB-R at Stone – the framework provides guidance on the expected contents of a maintenance base specific travel plan;
- details of the requirements for setting targets for encouraging sustainable travel;
- consideration of occasional maintenance activities; and
- consideration of how delivery and servicing and car parking management plans should be linked in with the IMB-R specific plans.

4.4.2 However, the impact of any reduction in sole occupancy car travel as a result of these measures has not been considered as part of the TA. Therefore, the TA considers a reasonable worst case assessment in terms of traffic impacts. Annex A of this report contains the FTP for the Proposed Scheme.

5 Baseline conditions

5.1 Introduction

5.1.1 This section of the TA outlines the existing condition of transport networks through which the Proposed Scheme is aligned. It describes the transport infrastructure and operations that could potentially be affected either by the construction or operation of the Proposed Scheme.

5.1.2 The scope of work and study area has been discussed with the key transport authorities including SCC, CEC and Highways England. Existing transport network conditions have been identified using various methods including desk-top research, baseline surveys, site visits and engagement with local transport authorities.

5.1.3 Due to the size and complexity of the overall route-wide study area of the TA, the description of baseline conditions has been split into CA for ease of understanding. Reporting runs from south to north along the route, from the Fradley to Colton area to the South Cheshire area.

5.1.4 Strategic routes such as the M6 and the WCML cross multiple CA and, as such, impacts generated in one CA could have impacts in other CA. In defining the baseline, potential impacts beyond the boundaries of the CA have also been considered.

5.1.5 New baseline transport surveys have been used to inform the existing situation. There are three transport models that are also available to help inform the future baseline traffic conditions. These are the Crewe SATURN Model (owned by CEC), the Stafford SATURN Model (owned by SCC) and the SMP junctions 13 - 15 SATURN model (owned by Highways England).

5.2 Baseline surveys

5.2.1 Baseline transport surveys have been undertaken along the entire route of the Proposed Scheme. The surveys undertaken have generally been proportionate to the expected type and location of impact. Assessment of the data indicates that the morning and evening peak hours are 08:00 - 09:00 and 17:00 - 18:00. Surveys of pedestrian, cyclist and equestrian users have also taken account of greater levels of use at weekends and on Bank Holidays.

5.2.2 Further details on the type and timings of the baseline transport surveys are identified in the following sections, with a more detailed description of the baseline surveys included in the baseline survey report (see BID-TR-001-000).

5.3 Fradley to Colton area

Study area

5.3.1 Roads potentially affected by the Proposed Scheme in the Fradley to Colton area include the A38(T) Rykneld Street, the A51 Stafford Road, the A515 Lichfield Road, the A513 Rugeley Road, the A5192 Eastern Avenue, the B5014 Uttoxeter Road, the B5013 Uttoxeter Road and local roads and lanes serving the settlements of Blithbury, Kings Bromley, Armitage and Handsacre.

5.3.2 The WCML runs parallel to the Proposed Scheme alignment approximately 1.5km to the south. Similarly, the navigable Trent and Mersey Canal runs broadly parallel to the Proposed Scheme approximately 500m to the south. The location of the key transport infrastructure can be found in Figure B1 and Figure B6 (see Annex B).

Local land uses

5.3.3 The Fradley to Colton area is predominantly rural, comprising largely of fields, small towns, villages and hamlets including Fradley, Kings Bromley, Handsacre, Blithbury and Colton/Stockwell Heath. To the south lies the City of Lichfield with a population of approximately 100,000[41]. At the western end of the area is the market town of Rugeley, with a population of around 25,000[42].

Surveys

5.3.4 Initial traffic surveys were undertaken in 2015 in November and December, with additional surveys undertaken in 2016 within the months of February, March, July and November and further surveys undertaken in March 2017. Non-motorised user surveys were undertaken in2016 within the months of May, June and November and April 2017 to establish the usage of roads and PRoW by pedestrians, cyclists and equestrians in the area of the route of the Proposed Scheme. The survey types and locations are shown in the baseline survey report (see BID-TR-001-000), alongside the summarised survey data.

Traffic surveys

5.3.5 The traffic surveys comprise automatic traffic counts (ATCs) on road links, manual classified counts (MCCs) and QLS at junctions across the study area. Where possible, ATC data was gathered for a two-week period. In total 122 traffic surveys have been undertaken in the Fradley to Colton area.

5.3.6 In addition to the newly commissioned surveys, existing transport survey data has been obtained from SCC (and the HS2 Phase One ES for the interface between HS2 Phase One and the Proposed Scheme). These include ATCs, MCCs and QLSs.

[41] Lichfield Council (undated), *Economic Development Strategy 2016 – 2020*, https://lichfielddc.gov.uk/Business/Economic-Development-Strategy-2016-2020.pdf

[42] Staffordshire Council (2011), *Rugeley Rural Hub Town – Profile,* https://www.staffordshire.gov.uk/environment/eLand/rural-development-team/Rugeley-Hub-Town-Profile.pdf

Non-motorised user surveys

5.3.7 As appropriate to the role of the PRoW, these surveys covered weekday and weekend use. The surveys included:

- roads and associated footways intersected by the Proposed Scheme and those potentially affected by proposed construction works; and
- PRoW intersected or likely to be affected including footpaths, bridleways, cycleways and canal towpaths.

Highway network

Strategic and primary 'A' road network

5.3.8 There is one strategic road which runs through the Fradley to Colton area, the A38(T) Rykneld Street. This highway runs in a north-east to south-west direction and connects Alrewas, Fradley and Lichfield in this locality and is a primary route to central and eastern Birmingham. The A38(T) Rykneld Street in the Fradley to Colton area is a dual carriageway with a 70mph speed limit. Grade separated junctions connect the A38(T) Rykneld Street to settlements along the road, which is also crossed by several grade separated overbridges and underpasses. The A38(T) Rykneld Street is managed by Highways England. All other adopted roads in the Fradley to Colton area are managed by SCC. It is expected that the A38(T) Rykneld Street will be a primary access route for construction traffic.

5.3.9 The A515 Lichfield Road like the A38(T) Rykneld Street, has a broadly north-east south-west alignment and links the A51 Stafford Road with the A50 through Kings Bromley in this area. The A515 Lichfield Road passes through Kings Bromley and then continues northwards on to Yoxall. The A515 Lichfield Road will cross the alignment of the Proposed Scheme just south of the junction with the A513 Rugeley Road. In this locality and for much of its length the A515 is a single carriageway road with a 60mph speed limit. It is expected that the A515 will be a primary access route for construction traffic between the A51 Stafford Road and A513 Rugeley Road.

5.3.10 The A51 Stafford Road provides the primary east-west connection in the Fradley to Colton area and runs broadly parallel and to the south of the Proposed Scheme alignment. The A51 Stafford Road is primarily a single carriageway road connecting Rugeley with Lichfield and then destinations beyond with varying speed limits up to 50mph. It is expected that the A51 Stafford Road will be a primary access route for construction traffic.

5.3.11 Figure B1 (see Annex B) illustrates the strategic, primary and local road network in Fradley to Colton area.

Local road network

5.3.12 The key local roads are as follows (road names provided are those where the Proposed Scheme intersects them; these may differ at other points along the roads within the study area):

- The A513 Rugeley Road, which runs in a broadly east to west direction, crosses the A515 Lichfield Road and connects the A51 Rugeley Eastern Bypass to the

A38(T) Rykneld Street, just south of Alrewas. The A513 Rugeley Road is primarily a single carriageway road with a 60 mph speed limit, reducing to 30 mph through Kings Bromley. The road crosses the alignment of the Proposed Scheme approximately 1km from the centre of Kings Bromley. It is expected that the A513 Rugeley Road will be a primary access route for construction traffic.

- The B5014 Uttoxeter Road follows a north to south alignment and connects the settlements of Blithbury and Abbotts Bromley to Uttoxeter in the north and Handsacre and Hill Ridware to Lichfield in the south. The B5014 Uttoxeter Road is a single carriageway road with a 50mph speed limit with reduced speeds in built up areas. The road crosses the alignment of the Proposed Scheme approximately 500m south of Blithbury. It is expected that the B5014 Uttoxeter Road will provide access to two construction compounds north of its junction with the A513 Rugeley Road.
- The B5013 Uttoxeter Road follows a north to south alignment from Uttoxeter to Rugeley via Admaston. The B5013 Uttoxeter Road is primarily a single carriageway road with a 60mph speed limit. The road crosses the alignment of the Proposed Scheme approximately 1.3km south of Admaston. It is expected that the B5013 Uttoxeter Road will provide access to one construction compound.
- Wood End Lane follows an east - west alignment and connects the A38(T) Rykneld Street with the B5014 Uttoxeter Road via the Fradley Park industrial estate. Wood End Lane is a single carriageway road with a 40mph speed limit. It is expected that Wood End Lane will be used as a route for construction traffic.

5.3.13 There are a number of lower order roads which cross the alignment of the Proposed Scheme and are therefore potentially affected by the Proposed Scheme. These are:

- Common Lane, between A515 Lichfield Road and Crawley Lane;
- Shaw Lane, between A515 Lichfield Road and A513 Rugeley Road;
- Pipe Wood Lane between Pipe Ridware and Blithbury Road;
- Blithbury Road between Stonyford Lane and the B5014 Uttoxeter Road;
- Hadley Gate Lane, between Blithbury Road and the B5014 Uttoxeter Road;
- Newlands Lane, east of High Street (Colton);
- Newlands Lane, west of High Street (Colton); and
- Moor Lane, between the B5013 Uttoxeter Road and Newlands Lane.

Baseline traffic flows

5.3.14 The baseline traffic flows for the strategic and primary 'A' roads are summarised for the Fradley to Colton area in Table 2 below. Table 3 provides baseline traffic flows for local roads in the area.

Table 2: Fradley to Colton strategic and primary road network 2016 baseline flows (vehicles)

Location	Direction[43]	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT[44]	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A38(T) Rykneld Street (between Burton Road and Rykneld Street/north-bound slip)	SB	417	7	512	7	4876	85
	NB	443	9	506	6	5118	106
A51 Birmingham Road (between Friary Road and St John Street)	NB	517	26	850	18	7433	294
	SB	681	35	479	10	6307	297
A51 Brereton Hill (between Brereton Hill Lane and Lea Hall Way)	NB	652	20	937	20	7847	265
	SB	826	21	604	15	7172	278
A51 Friary Avenue (between Friary Island and Birmingham Road)	SB	815	36	792	14	8741	330
	NB	787	34	741	13	8312	316
A51 Lea Hall Way (between Armitage Road and Brereton Hill)	NB	667	16	774	19	6543	239
	SB	671	21	724	15	6826	284
A51 Lea Hall Way (between Armitage Road and Wheelhouse Road)	NB	848	16	813	14	7933	237
	SB	777	24	1006	28	8637	285
A51 Lea Hall Way (between Wheelhouse Road and Power Station Road)	NB	758	14	983	13	8009	221
	SB	845	20	815	13	8243	250
A51 Rugeley Eastern Bypass (between Colton Road and Lichfield Road)	WB	521	16	852	10	6432	187
	EB	654	18	531	14	5713	181

[43] NB = north-bound; NWB = north-west bound; SB = south-bound; SEB = south-east bound; EB = east-bound; and WB = west-bound
[44] AADT – Annual Average Daily Traffic, represents the average daily traffic flow on the link. This data has been calculated using average ATC data

Location	Direction[43]	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT[44]	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A51 Stafford Road (between Constitution Island and Brereton Hill Lane)	NB	587	19	961	20	7994	278
	SB	1001	27	629	12	8103	291
A51 Stafford Road (between Eastern Avenue and Featherbed Lane)	NB	606	11	967	13	8741	197
	SB	1025	26	677	13	9136	250
A51 Upper St John Street (between Birmingham Road and Tamworth Road)	SB	650	40	742	16	7571	368
	NB	650	40	618	13	6894	351
A515 Lichfield Road (between Common Lane and the Proposed Scheme)	NB	187	17	250	5	2247	209
	SB	323	10	173	6	2553	152
A515 Lichfield Road (between Crawley Lane and Manor Road)	NB	510	21	449	8	4736	236
	SB	523	19	505	14	5078	268
A515 Lichfield Road (between Wood End Lane and Common Lane)	NB	209	11	291	2	2600	133
	SB	322	8	224	6	2661	150
A515 Lichfield Road (between Crawley Lane and Rugeley Road)	NB	510	21	449	8	4736	236
	SB	523	19	505	14	5078	268
A515 Main Street (between Town Hill and Lodge Lane)	NB	228	23	186	9	2187	256
	SB	228	17	227	10	2403	211
A515 Tewnalls Lane (between Stafford Road and Wood End Lane)	NB	369	20	448	16	3942	232
	SB	411	22	284	10	3352	210
A515 Yoxall Road (between Manor Road and Lichfield Road)	EB	284	25	287	10	2942	294
	WB	359	17	264	10	3209	225

Table 3: Fradley to Colton local road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A51 Western Bypass (between Friary Island and Eastern Avenue)	NB	585	13	435	12	5155	143
	SB	418	10	616	9	5118	122
A5127 Trent Valley Road (between Eastern Avenue and Rykneld Street)	EB	474	7	523	5	5732	92
	WB	614	12	595	8	5855	105
A513 Alrewas Bypass (from Kings Bromley Road to A38 at Croxall Road)	EB	405	24	287	12	3542	254
	WB	266	15	409	13	3453	194
A513 Alrewas Road (between Yoxall Road and Orgreave Hall Lane)	EB	417	21	296	11	3612	207
	WB	271	20	409	16	3448	240
A513 Kings Bromley Lane (between the Proposed Scheme and Uttoxeter Road)	WB	275	10	394	7	3141	111
	EB	381	11	242	4	2925	98
A513 Lichfield Road (between Rugeley Road and the Proposed Scheme)	NB	187	17	250	5	2247	209
	SB	323	10	173	6	2553	152
A513 Rugeley Road (between Shaw Lane and the Proposed Scheme)	WB	270	10	392	9	3083	114
	EB	368	8	242	3	2839	67
A5192 Cappers Lane (between Austin Cote Lane and Rykneld Street)	EB	384	11	439	7	4431	130
	WB	391	9	406	8	3918	130
A5192 Cappers Lane (between Trent Valley Road and Austin Cote Lane)	NB	679	14	729	12	7046	155
	SB	714	15	636	14	7391	163
A5192 Eastern Avenue (between Grange Lane and Stafford Road)	NB	585	13	435	12	5155	143

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	418	10	616	9	5118	122
A5192 Eastern Avenue (between Netherstowe Lane and Grange Lane)	WB	423	8	800	7	6133	119
	EB	729	14	476	12	6218	149
A5192 Eastern Avenue (between Trent Valley Road and Netherstowe Lane)	NB	511	10	746	9	7258	130
	SB	698	19	650	13	7724	168
A5206 London Road (between Tamworth Road and A38)	SB	634	20	639	5	6921	163
	NB	707	22	758	6	7971	184
B5013 Abbots Bromley Road (between Newton Hurst Lane and Quee Lane)	NB	221	15	184	5	1839	106
	SB	204	10	223	4	1939	75
B5013 Colton Road (between Blithbury Road and Bellamour Way)	NB	328	6	283	2	2621	50
	SB	263	9	268	1	2682	41
B5013 Colton Road (between Rugeley Eastern Bypass and Blithbury Road)	EB	394	11	338	4	3562	51
	WB	406	6	438	2	3879	50
B5013 Uttoxeter Road (between Uttoxeter Road and Dunstall Lane)	NB	256	10	221	4	2196	75
	SB	254	12	248	5	2316	95
B5013 Uttoxeter Road (between Bellamour Lane and Colton Road)	WB	255	19	279	3	2771	183
	EB	233	18	233	3	2420	165
B5013 Uttoxeter Road (between Proposed Scheme and Moor Lane)	NB	244	11	230	3	2176	94
	SB	252	10	258	6	2337	100
B5013 Uttoxeter Road (between Moor Lane and Bellamour Lane)	NB	243	14	233	2	2192	93

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	260	8	263	6	2409	85
B5013 Uttoxeter Road (between Sherracop Lane and the Proposed Scheme)	NB	244	11	230	3	2176	94
	SB	252	10	258	6	2337	100
B5013 Uttoxeter Road (between Sherracop Lane and Uttoxeter Road)	NB	225	12	207	4	1983	103
	SB	215	7	242	4	2096	70
B5014 Lichfield Road (between Ashbrook Lane and Seedcroft Lane)	SB	101	3	80	1	830	27
	NB	92	4	73	2	756	35
B5014 Rake End Lane (between School Lane and Stoneyford Lane)	NB	107	5	96	2	1020	47
	SB	112	5	92	2	1029	46
B5014 Uttoxeter Road (between Blithbury Road and the Proposed Scheme)	NB	72	3	67	1	686	27
	SB	90	3	58	1	732	23
B5014 Uttoxeter Road (between Blithbury Road and Seedcroft Lane)	NB	87	4	80	2	783	31
	SB	124	6	86	6	989	63
B5014 Uttoxeter Road (between Common Lane and School Lane	WB	116	6	160	2	1450	51
	EB	193	5	94	2	1505	45
B5014 Uttoxeter Road (between Kings Bromley Lane and Common Lane)	NB	138	2	191	1	1652	13
	SB	219	2	134	1	1647	14
B5014 Uttoxeter Road (between Stoneyford Lane and the Proposed Scheme)	NB	72	3	67	1	686	27
	SB	90	3	58	1	732	23
B5234 Ashbrook Lane (between Lichfield Road and Bromley Road)	EB	173	6	94	2	1258	49

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	WB	104	5	151	2	1199	47
Shaw Lane (between Rugeley Road and the Proposed Scheme)	SB	11	0	5	0	95	3
	NB	6	0	6	0	70	2
Bellamour Lane (between Uttoxeter Road and Main Road)	WB	72	1	58	1	637	17
	EB	66	2	49	1	565	19
Bellamour Way (between High Street and Uttoxeter Road)	WB	77	1	45	0	738	17
	EB	48	2	74	1	735	28
Hollow Lane (between High Street and Blithbury Road)	EB	21	1	19	0	220	10
	WB	15	0	23	0	206	5
Blithbury Road (between Hadley Gate and the Proposed Scheme)	WB	41	2	47	1	489	18
	EB	68	2	39	1	594	18
Blithbury Road (between Hollow Lane and Colton Road)	WB	75	4	76	3	838	48
	EB	80	3	62	1	791	27
Blithbury Road (between Pipe Lane and Dawson Lane)	EB	12	1	14	0	142	8
	WB	18	0	13	1	169	7
Blithbury Road (between Stoneyford Lane and Blithbury Road)	WB	80	2	74	1	842	26
	EB	101	2	80	1	987	25
Blithbury Road (between Uttoxeter Road and Pipe Lane)	EB	40	0	24	0	245	5
	WB	26	1	31	0	244	3
Blithbury Road (between Uttoxeter Road and the Proposed Scheme)	WB	41	2	47	1	489	18

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	EB	68	2	39	1	594	18
Wood End Lane (between Lichfield Road and Netherstowe Lane)	SB	370	4	131	5	2062	115
	NB	154	6	409	4	2141	101
Wood End Lane (between Gorse Lane and Nanscawen Road)	EB	382	13	168	8	2488	170
	WB	202	15	459	27	3291	469
Wood End Lane (between Rykneld Street and Wood End Lane/west-bound)	EB	510	67	429	41	4441	1037
	WB	160	21	217	21	1780	400
Wood End Lane (between Brookhay Lane and Wood End Lane/west-bound)	WB	160	21	217	21	1780	400
	EB	510	67	429	41	4441	1037
The Friary (between Friary Island and Upper St John Street)	EB	456	25	651	15	6023	263
	WB	690	37	585	13	6932	337
Dawson Lane (between Blithbury Road and the Proposed Scheme)	SB	0	0	1	0	7	0
	NB	2	0	1	0	13	0
Dawson Lane (between Pipe Lane and the Proposed Scheme)	NB	2	0	1	0	13	0
	SB	0	0	1	0	7	0
Pipe Lane (between Blithbury Road and Pipe Lane/south-bound)	SB	2	0	1	0	23	1
	NB	2	0	2	0	25	1
Pipe Lane (between Proposed Scheme and Quintons Orchard)	SB	2	0	3	0	25	2
	NB	2	0	1	0	14	1

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
Pipe Lane (between Pipe Lane/south-bound and the Proposed Scheme)	SB	2	0	3	0	25	2
	NB	2	0	1	0	14	1
Crawley Lane (between Lichfield Road and Common Lane)	SB	5	1	5	1	50	5
	NB	4	0	4	0	41	2
Common Lane (between Crawley Lane and the Proposed Scheme)	WB	4	0	3	0	35	2
	EB	4	1	2	0	25	3
Common Lane (between Lichfield Road and the Proposed Scheme)	EB	4	1	2	0	25	3
	WB	4	0	3	0	35	2
Sherracop Lane(between Uttoxeter Road and Park Lane)	SEB	0	0	1	0	5	1
	NWB	1	0	4	0	31	3
High Street (between Newlands Lane and Heathway)	SB	8	0	12	0	109	3
	NB	7	0	5	0	66	5
Hadley Gate Lane (between Blithbury Road and the Proposed Scheme)	NB	0	0	1	0	14	0
	SB	1	0	0	0	13	0
Moor Lane (between Proposed Scheme and Uttoxeter Road)	WB	9	1	6	0	72	8
	EB	4	0	4	0	40	0
Moor Lane (between Newlands Lane and the Proposed Scheme)	WB	9	1	6	0	72	8
	EB	4	0	4	0	40	0
Newlands Lane (between Moor Lane and close to Narrow Lane)	SB	4	0	9	0	70	3
	NB	3	0	3	0	29	5

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
Newlands Lane (between High Street and the Proposed Scheme)	SB	4	0	9	0	70	3
	NB	3	0	3	0	29	5
Newlands Lane (between High Street and the Proposed Scheme/east-bound)	EB	2	0	1	0	20	1
	WB	2	0	1	0	21	1
Pipe Lane (between Common Lane and Chadwick Crescent)	WB	6	1	7	0	61	0
	EB	12	0	11	0	74	1
Pipe Lane (north of Common Lane)	WB	25	1	18	0	249	10
	EB	14	1	22	1	206	14
Pipe Lane (between Dawson Lane and the Proposed Scheme)	EB	12	1	19	1	179	11
	WB	21	1	13	0	198	7
Stonyford Lane (between Uttoxeter Road and Blithbury Road)	NB	41	0	38	1	360	5
	SB	24	1	36	0	304	4
Nanscawen Road (south of Wood End Lane)	SB	29	2	14	2	141	30
	NB	14	3	24	2	149	25
Wood End Lane (between Gorse Lane and Netherstowe Lane)	SB	365	6	161	6	2075	148
	NB	194	8	414	6	2262	122
Wood End Lane (between Nanscawen Road and A38(T) Rykneld Street)	EB	366	26	257	14	2886	526
	WB	309	26	423	45	3525	940

Junction operation

5.3.15 The operation of the key junctions that could be affected by the Proposed Scheme works, or will potentially be used as the main access routes from the SRN through the study area to the construction sites, have been assessed and the results are summarised below.

5.3.16 Junctions 9 software has been used to calculate the existing capacity of all priority controlled junctions within the study area. LINSIG software has been used to calculate the existing capacity of all signal controlled junctions.

5.3.17 Junctions 9 calculates the Ratio of Flow to Capacity (RFC) and queue for each approach to a junction. The RFC indicates the likely performance of a junction under a given set of traffic flows and the queue represents a typical queue found at the end of each time segment within the modelled time period. LINSIG calculates the Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) for each approach under a given set of traffic flows, with the MMQ the average maximum queue modelled within each traffic signal cycle.

5.3.18 At over 85% to 90% DoS or 0.85 to 0.9 RFC, queues are likely to increasingly occur. Consequently permanent highway infrastructure is generally designed to stay below this level. At over 100% DoS or 1.0 RFC, if sustained over time, the level of traffic cannot be accommodated. This is referred to as 'theoretical maximum capacity'. In congested urban areas, junctions often operate at or above the theoretical capacity for short periods.

5.3.19 Where two DoS values are presented in the results tables, this provides the value for both the approach lane and its respective flare. All queue lengths and traffic flow inputs to both the LINSIG and Junctions 9 models are presented in PCUs[45].

5.3.20 The results for the Fradley to Colton area are presented in the order of roundabout junctions, priority controlled (give-way) and signalised junctions.

Lancaster Road/Wood End Lane/Wellington Crescent

5.3.21 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 4 below.

[45] Typically a car will represent one PCU, whereas a HGV will generally be somewhere between two to three PCUs depending on the average length of HGV included in the junction modelling assessment

Table 4: 2016 baseline performance at Lancaster Road/Wood End Lane/Wellington Crescent junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Wood End Lane (west)	83	0.05	0
Lancaster Road	480	0.17	0
Wood End Lane (east)	27	0.02	0
Wellington Crescent	628	0.24	0
	2016 PM (17:00 - 18:00) baseline results		
Wood End Lane (west)	192	0.11	0
Lancaster Road	391	0.13	0
Wood End Lane (east)	179	0.11	0
Wellington Crescent	343	0.13	0

5.3.22 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Common Lane/Wood End Lane

5.3.23 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 5.

Table 5: 2016 baseline performance at Common Lane/Wood End Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Wood End Lane (west)	518	0.29	1
Common Lane	434	0.12	0
Wood End Lane (east)	276	0.09	0
	2016 PM (17:00 - 18:00) baseline results		
Wood End Lane (west)	359	0.2	0
Common Lane	391	0.13	0
Wood End Lane (east)	428	0.14	0

5.3.24 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Wood End Lane/Gorse Lane/Tesco access

5.3.25 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 6.

Table 6: 2016 baseline performance at Wood End Lane/Gorse Lane/Tesco access junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Gorse Lane	93	0.07	0
Tesco Access	0	0	0
Wood End Lane (east)	233	0.16	0
Wood End Lane (west)	365	0.26	0
	2016 PM (17:00 - 18:00) baseline results		
Gorse Lane	71	0.05	0
Tesco Access	0	0	0
Wood End Lane (east)	495	0.33	1
Wood End Lane (west)	174	0.13	0

5.3.26 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A515 Featherbed Lane/A51 Stafford Road

5.3.27 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 7.

Table 7: 2016 baseline performance at A515 Featherbed Lane/A51 Stafford Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Stafford Road (north)	1288	0.64	2
A515 Featherbed Lane	418	0.37	1
A51 Stafford Road (south)	878	0.43	1
	2016 PM (17:00 - 18:00) baseline results		
A51 Stafford Road (north)	684	0.35	1
A515 Featherbed Lane	406	0.3	0
A51 Stafford Road (south)	1291	0.65	2

5.3.28 The model shows that this junction operates within capacity in the AM and PM peak hours.

A51 Western Bypass/The Friary/Friary Avenue/Friary Road

5.3.29 This junction is a five-arm roundabout junction with signalised pedestrian crossing facilities on The Friary arm. The junction also provides access to a public house located on its central island. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 8.

Table 8: 2016 baseline performance at A51 Western Bypass/The Friary/Friary Avenue/Friary Road junction[46]

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Western Bypass	918	0.54	1
The Friary	476	0.19	0
Friary Avenue	35	0.03	0
A51 The Friary/Friary Road	823	0.38	1
Friary Road	772	0.41	1
	2016 PM (17:00 - 18:00) baseline results		
A51 Western Bypass	958	0.59	1
The Friary	726	0.31	0
Friary Avenue	72	0.09	0
A51 The Friary/Friary Road	747	0.53	1
Friary Road	593	0.34	1

5.3.30 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Lea Hall Way/A51 Brereton Hill /A460 Brereton Hill

5.3.31 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 9.

Table 9: 2016 baseline performance at A51 Lea Hall Way/A51 Brereton Hill/A460 Brereton Hill junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Lea Hall Way	955	0.61	2
A51 Brereton Hill	916	0.55	1
A460 Brereton Hill	680	0.4	1
	2016 PM (17:00 - 18:00) baseline results		
A51 Lea Hall Way	751	0.49	1
A51 Brereton Hill	968	0.55	1
A460 Brereton Hill	984	0.63	2

5.3.32 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

[46] Site-specific correction factors applied, involving additional calibration undertaken on the Junctions 9 model to ensure validation against observed queueing conditions

A51 Lea Hall Way/A513 Armitage Road

5.3.33 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 10.

Table 10: 2016 baseline performance at A51 Lea Hall Way/Armitage Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Lea Hall Way (north)	838	0.59	2
A513 Armitage Road (east)	656	0.51	1
A51 Lea Hall Way (south)	687	0.44	1
A513 Armitage Road (west)	300	0.3	0
	2016 PM (17:00 - 18:00) baseline results		
A51 Lea Hall Way (north)	1018	0.73	3
A513 Armitage Road (east)	729	0.59	1
A51 Lea Hall Way (south)	821	0.56	1
A513 Armitage Road (west)	280	0.3	0

5.3.34 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Lea Hall Way /Wheelhouse Road

5.3.35 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 11.

Table 11: 2016 baseline performance at A51 Lea Hall Way/Wheelhouse Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Lea Hall Way (south)	885	0.52	1
Wheelhouse Road	107	0.1	0
A51 Lea Hall Way (north)	893	0.47	1
	2016 PM (17:00 - 18:00) baseline results		
A51 Lea Hall Way (south)	956	0.53	1
Wheelhouse Road	332	0.36	1
A51 Lea Hall Way (north)	798	0.44	1

5.3.36 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Rugeley Eastern Bypass/A51 Lea Hall Way/Power Station Road

5.3.37 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 12.

Table 12: 2016 baseline performance at A51 Rugeley Eastern Bypass/Power Station Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Rugeley Eastern Bypass	800	0.41	1
Power Station access	0	0	0
A51 Lea Hall Way	749	0.35	1
Power Station Road	199	0.11	0
	2016 PM (17:00 - 18:00) baseline results		
A51 Rugeley Eastern Bypass	535	0.28	0
Power Station access	12	0.01	0
A51 Lea Hall Way	1056	0.5	1
Power Station Road	277	0.17	0

5.3.38 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Rugeley Eastern Bypass/ B5013 Station Road

5.3.39 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 13.

Table 13: 2016 baseline performance at A51 Rugeley Eastern Bypass/Station Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 (north) Rugeley Eastern Bypass	779	0.45	1
B5013 Station Road (east)	411	0.3	1
A51 (south) Rugeley Eastern Bypass	533	0.3	1
B5013 Station Road (west)	410	0.32	1
	2016 PM (17:00 - 18:00) baseline results		
A51 (north) Rugeley Eastern Bypass	597	0.36	1
B5013 Station Road (east)	472	0.32	1
A51 (south) Rugeley Eastern Bypass	745	0.44	1
B5013 Station Road (west)	451	0.38	1

5.3.40 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A5192 Cappers Lane/Austin Cote Lane/Europa Way

5.3.41 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 14.

Table 14 2016 baseline performance at A5192 Cappers Lane/Austin Cote Lane/Europa Way junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Europa Way	227	0.22	0
A5192 Cappers Road (east)	548	0.45	1
Austin Cote Lane	531	0.52	1
A5192 Cappers Road (west)	839	0.66	2
	2016 PM (17:00 - 18:00) baseline results		
Europa Way	415	0.43	1
A5192 Cappers Road (east)	520	0.48	1
Austin Cote Lane	393	0.38	1
A5192 Cappers Road (west)	778	0.55	1

5.3.42 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A5192 Eastern Avenue/A5127 Burton Road/A5192 Cappers Lane/A5127 Trent Valley Road

5.3.43 This junction is a five-arm roundabout junction with controlled pedestrian crossing facilities on the A5192 Eastern Avenue (north) arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 15.

Table 15: 2016 baseline performance at A5192 Eastern Avenue/A5127 Burton Road/A5192 Cappers Lane/A5127 Trent Valley Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A5192 Eastern Avenue (north)	725	0.63	2
A5127 Burton Road (east)	644	0.66	2
A5192 Cappers Lane (south)	712	0.7	3
A5127 Trent Valley Road (west)	567	0.77	3
Valley Lane	123	0.3	0
	2016 PM (17:00 - 18:00) baseline results		
A5192 Eastern Avenue (north)	672	0.53	1
A5127 Burton Road (east)	846	0.78	4
A5192 Cappers Lane (south)	757	0.83	5
A5127 Trent Valley Road (west)	562	0.88	6
Valley Lane	82	0.24	0

5.3.44 The model shows that this junction operates close to its capacity in the AM and PM peak hours. The A5127 Trent Valley Road (west) is shown to have an RFC value of 0.77 in the AM peak and 0.88 in the PM peak, with queue lengths of three and six PCUs respectively. The PM peak results also demonstrate RFC values of 0.78 on the A5127 Burton Road (east) and 0.83 on the A5192 Cappers Road (south), with queues of four and five PCUs respectively.

A51 Birmingham Road/A5127 Birmingham Road/A461 Sainte Foy Avenue/A51 The Friary

5.3.45 This junction is a four-arm roundabout junction with controlled pedestrian crossing facilities on the Friary Road (north) arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 16.

Table 16: 2016 baseline performance at A51 Birmingham Road/A5127 Birmingham Road/A461 Saint Foy Avenue/A51 The Friary junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 The Friary	808	0.59	2
A51 Birmingham Road	599	0.48	1
A5127 Birmingham Road	681	0.58	1
A461 Sainte Foy Avenue	604	0.54	1
	2016 PM (17:00 - 18:00) baseline results		
A51 The Friary	742	0.49	1
A51 Birmingham Road	842	0.67	2
A5127 Birmingham Road	643	0.66	2
A461 Sainte Foy Avenue	440	0.38	1

5.3.46 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A515 Lichfield Road/Wood End Lane

5.3.47 This junction is a three-arm priority controlled (give way) T- junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 17.

Table 17: 2016 baseline performance at A515 Lichfield Road/Wood End Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Wood End Lane (left)	100	0.17	0
Wood End Lane (right)	46	0.16	0
A515 Lichfield Road (south) (ahead + right)	356	0.58	2
A515 Lichfield Road (south) (ahead)	81	-	-
A515 Lichfield Road (north) (left)	112	-	-
A515 Lichfield Road (north) (ahead)	237	-	-
	2016 PM (17:00 - 18:00) baseline results		
Wood End Lane (left)	339	0.57	1
Wood End Lane (right)	97	0.27	0
A515 Lichfield Road (south) (ahead + right)	136	0.21	0
A515 Lichfield Road (south) (ahead)	131	-	-
A515 Lichfield Road (north) (left)	39	-	-
A515 Lichfield Road (north) (ahead)	162	-	-

5.3.48 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A513 Rugeley Road/A515 Lichfield Road/A515 Tewnalls Lane

5.3.49 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 18.

Table 18: 2016 baseline performance at A513 Rugeley Road/A515 Lichfield Road/A515 Tewnalls Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A513 Rugeley Road (left + right)	408	0.64	2
A515 (north) Lichfield Road (ahead + right)	425	0.59	2
A515 (north) Lichfield Road (ahead)	136	-	-
A515 Tewnalls Lane (left)	14	-	-
A515 Tewnalls Lane (ahead)	205	-	-
	2016 PM (17:00 - 18:00) baseline results		
A513 Rugeley Road (left + right)	243	0.37	1
A515 (north) Lichfield Road (ahead + right)	526	0.8	4
A515 (north) Lichfield Road (ahead)	49	-	-
A515 Tewnalls Lane (left)	45	-	-
A515 Tewnalls Lane (ahead)	206	-	-

5.3.50 The model shows that the junction operates within capacity at present, although the A515 (north) Lichfield Road ahead and right turn movement shown to operate with an RFC of 0.8 and a corresponding queue of four PCUs in the PM peak period.

B5014 Lichfield Road/A515 Tewnalls Lane

5.3.51 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 19.

Table 19: 2016 baseline performance at B5014 Lichfield Road/A515 Tewnalls Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
B5014 Lichfield Road (left)	178	0.96	6
B5014 Lichfield Road (right)	329	0.94	9
A515 (north) Tewnalls Lane (ahead + right)	92	0.13	0
A515 (north) Tewnalls Lane (ahead)	303	-	-
A515 (south) Tewnalls Lane (left)	145	-	-
A515 (south) Tewnalls Lane (ahead)	316	-	-
	2016 PM (17:00 - 18:00) baseline results		
B5014 Lichfield Road (left)	56	0.13	0
B5014 Lichfield Road (right)	149	0.47	1
A515 (north) Tewnalls Lane (ahead + right)	294	0.46	1
A515 (north) Tewnalls Lane (ahead)	180	-	-
A515 (south) Tewnalls Lane (left)	303	-	-
A515 (south) Tewnalls Lane (ahead)	254	-	-

5.3.52 The model shows that the junction is approaching capacity in the AM peak at present, with the B5014 Lichfield Road shown to operate with an RFC of 0.96 and a corresponding combined queue of 15 PCUs in the AM Peak period.

B5014 Uttoxeter Road /A513 Kings Bromley Lane/A513 Uttoxeter Road

5.3.53 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 20.

Table 20: 2016 baseline performance at B5014 Ridware Road/A513 Kings Bromley Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A513 Kings Bromley Lane (left)	232	0.36	1
A513 Kings Bromley Lane (right)	47	0.14	0
A513 Uttoxeter Road (ahead + right)	380	0.65	2
A513 Uttoxeter Road (ahead)	42	-	-
B5014 Uttoxeter Road (left)	95	-	-
B5014 Uttoxeter Road (ahead)	149	-	-
	2016 PM (17:00 - 18:00) baseline results		
A513 Kings Bromley Lane (left)	344	0.52	1
A513 Kings Bromley Lane (right)	77	0.2	0
A513 Uttoxeter Road (ahead + right)	249	0.4	1
A513 Uttoxeter Road (ahead)	67	-	-
B5014 Uttoxeter Road (left)	31	-	-
B5014 Uttoxeter Road (ahead)	71	-	-

5.3.54 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches

B5014 Uttoxeter Road/Blithbury Road

5.3.55 This junction is a four-arm priority controlled (give way) staggered cross-roads with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 21.

Table 21: 2016 baseline performance at B5014 Uttoxeter Road/Blithbury Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Blithbury Road (east) (ahead + left + right)	34	0.06	0
B5014 Uttoxeter Road (north) (left)	4	-	-
B5014 Uttoxeter Road (north) (ahead)	75	-	-
B5014 Uttoxeter Road (north) (right)	18	-	-
B5014 Uttoxeter Road (north) (ahead + right)	39	0.06	0
B5014 (north) Uttoxeter Road (ahead)	78	-	-
Blithbury Road (west) (ahead + left + right)	75	0.12	0
B5014 Uttoxeter Road (south) (left)	2	-	-
B5014 Uttoxeter Road (south) (ahead)	59	-	-
B5014 Uttoxeter Road (south) (right)	15	-	-
B5014 Uttoxeter Road (south) (ahead + right)	65	0.11	0
B5014 Uttoxeter Road (south) (ahead)	77	-	-
	2016 PM (17:00 - 18:00) baseline results		
Blithbury Road (east) (ahead + left + right)	29	0.05	0
B5014 Uttoxeter Road (north) (left)	7	-	-
B5014 Uttoxeter Road (north) (ahead)	43	-	-
B5014 Uttoxeter Road (north) (right)	28	-	-
B5014 Uttoxeter Road (north) (ahead + right)	51	0.09	0
B5014 (north) Uttoxeter Road (ahead)	45	-	-
Blithbury Road (west) (ahead + left + right)	45	0.07	0
B5014 Uttoxeter Road (south) (left)	6	-	-
B5014 Uttoxeter Road (south) (ahead)	60	-	-
B5014 Uttoxeter Road (south) (right)	2	-	-
B5014 Uttoxeter Road (south) (ahead + right)	21	0.03	0
B5014 Uttoxeter Road (south) (ahead)	81	-	-

5.3.56 The model shows that this junction operates within capacity in the AM and PM peak hours and minimal queuing on all approaches.

A51 (from Bardy Lane to Stafford Road)/Borough Lane

5.3.57 This junction is a three-arm priority controlled (give way) T-junction with 'ghost island' right turn facilities, with no controlled pedestrian crossing facilities. The existing

operation of the junction has been assessed for the AM and PM peak hours as shown in Table 22.

Table 22: 2016 baseline performance at A51 (from Bardy Lane to Stafford Road)/Borough Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Borough Lane (left + right)	181	0.79	3
A51 from Bardy Lane to Stafford Road (north) (ahead)	1132	-	-
A51 from Bardy Lane to Stafford Road (north) (right)	54	0.11	0
A51 from Bardy Lane to Stafford Road (south) (left)	27	-	-
A51 from Bardy Lane to Stafford Road (south) (ahead)	624	-	-
	2016 PM (17:00 - 18:00) baseline results		
Borough Lane (left + right)	69	0.39	1
A51 from Bardy Lane to Stafford Road (north) (ahead)	700	-	-
A51 from Bardy Lane to Stafford Road (north) (right)	64	0.18	0
A51 from Bardy Lane to Stafford Road (south) (left)	84	-	-
A51 from Bardy Lane to Stafford Road (south) (ahead)	1048	-	-

5.3.58 The model shows that this junction operates within capacity in the AM and PM peak hours with the Borough Lane arm showing an RFC value of 0.79 and a corresponding queue length of three PCUs in the AM peak.

A51 Brereton Hill/Brereton Hill Lane

5.3.59 This junction is a three-arm priority controlled (give way) T-junction with 'ghost island' right turn facilities, with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 23.

Table 23: 2016 baseline performance at A51 Brereton Hill/Brereton Hill Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 – 09:00) baseline results		
Brereton Hill Lane (left + right)	114	0.54	1
A51 Brereton Hill (west) (ahead)	926	-	-
A51 Brereton Hill (west) (right)	16	0.03	0
A51 Brereton Hill (east) (left)	41	-	-
A51 Brereton Hill (east) (ahead)	638	-	-
	2016 PM (17:00 - 18:00) baseline results		
Brereton Hill Lane (left + right)	43	0.23	0
A51 Brereton Hill (west) (ahead)	647	-	-
A51 Brereton Hill (west) (right)	0	0	0
A51 Brereton Hill (east) (left)	113	-	-
A51 Brereton Hill (east) (ahead)	988	-	-

5.3.60 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

B5013 Colton Road/Blithbury Road

5.3.61 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 24.

Table 24: 2016 baseline performance at B5013 Colton Road/Blithbury Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Blithbury Road (left + right)	94	0.16	0
B5013 Colton Road (south) (ahead + right)	179	0.27	1
B5013 Colton Road (south) (ahead)	201	-	-
B5013 Colton Road (north-west) (left)	10	-	-
B5013 Colton Road (north-west) (ahead)	353	-	-
	2016 PM (17:00 - 18:00) baseline results		
Blithbury Road (left + right)	112	0.19	0
B5013 Colton Road (south) (ahead + right)	92	0.14	0
B5013 Colton Road (south) (ahead)	217	-	-
B5013 Colton Road (north-west) (left)	3	-	-
B5013 Colton Road (north-west) (ahead)	361	-	-

5.3.62 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

B5013 Colton Road/Bellamour Way

5.3.63 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 25.

Table 25: 2016 baseline performance at B5013 Colton Road/Bellamour Way junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 – 09:00) baseline results		
Bellamour Way (left)	87	0.14	0
Bellamour Way (right)	39	0.1	0
B5013 Colton Road (south) (ahead + right)	87	0.14	0
B5013 Colton Road (south) (ahead)	167	-	-
B5013 Colton Road (north-west) (left)	28	-	-
B5013 Colton Road (north-west) (ahead)	268	-	-
	2016 PM (17:00 - 18:00) baseline results		
Bellamour Way (left)	39	0.06	0
Bellamour Way (right)	11	0.03	0
B5013 Colton Road (south) (ahead + right)	67	0.11	0
B5013 Colton Road (south) (ahead)	180	-	-
B5013 Colton Road (north-west) (left)	24	-	-
B5013 Colton Road (north-west) (ahead)	301	-	-

5.3.64 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A5192 Cappers Lane/A38(T) Rykneld Street Slip Road (south-bound)

5.3.65 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The junction provides access only to the A38 southbound on-slip. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 26.

Table 26: 2016 baseline performance at A5192 Cappers Lane/A38(T) Rykneld Street slip road (south-bound) junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A38 slip road (south-bound) (left + right)	0	0	0
A5192 Cappers Lane (west) (ahead + right)	507	0.81	5
A5192 Cappers Lane (west) (ahead)	35	-	-
A5192 Cappers Lane (east) (left)	52	-	-
A5192 Cappers Lane (east) (ahead)	135	-	-
	2016 PM (17:00 - 18:00) baseline results		
A38 slip road (south-bound) (left + right)	0	0	0
A5192 Cappers Lane (west) (ahead + right)	556	0.84	6
A5192 Cappers Lane (west) (ahead)	41	-	-
A5192 Cappers Lane (east) (left)	26	-	-
A5192 Cappers Lane (east) (ahead)	130	-	-

5.3.66 The model shows that this junction is currently operating close to the level at which queues and delay could arise on the A5192 Cappers Lane arm with RFC values of 0.81 and 0.84 in the AM and PM peak respectively and associated queues of five PCU and six PCU.

A5192 Cappers Lane/A38(T) Rykneld Street slip road (north-bound)

5.3.67 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The junction provides egress only from the north-bound off-slip from the A38. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 27.

Table 27: 2016 baseline performance at A5192 Cappers Lane/A38 slip road (north-bound) junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A38 slip road (north-bound) (left)	426	0.64	2
A38 slip road (north-bound) (right)	32	0.07	0
A5192 Cappers Lane (west) (ahead)	509	-	-
A5192 Cappers Lane (west) (right)	0	0	0
A5192 Cappers Lane (east) (left)	0	-	-
A5192 Cappers Lane (east) (ahead)	133	-	-
	2016 PM (17:00 - 18:00) baseline results		
A38 slip road (north-bound) (left)	373	0.57	1
A38 slip road (north-bound) (right)	51	0.11	0
A5192 Cappers Lane (west) (ahead)	543	-	-
A5192 Cappers Lane (west) (right)	0	0	0
A5192 Cappers Lane (east) (left)	0	-	-
A5192 Cappers Lane (east) (ahead)	129	-	-

5.3.68 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A5192 Eastern Avenue/Stafford Road

5.3.69 This junction is a three-arm priority controlled (give way) T-junction with 'kerbed central reserve' facilities with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 28.

Table 28: 2016 baseline performance at A5192 Eastern Avenue/Stafford Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Stafford Road (left + right)	172	0.38	1
Stafford Road (ahead)	657	-	-
A5192 Eastern Avenue (west) (right)	227	0.35	1
A5192 Eastern Avenue (west) (left)	105	-	-
A5192 Eastern Avenue (east) (ahead)	349	-	-
	2016 PM (17:00 - 18:00) baseline results		
Stafford Road (left + right)	237	0.51	1
Stafford Road (ahead)	370	-	-
A5192 Eastern Avenue (west) (right)	112	0.18	0
A5192 Eastern Avenue (west) (left)	115	-	-
A5192 Eastern Avenue (east) (ahead)	501	-	-

5.3.70 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Wood End Lane/A38(T) Rykneld Street slip roads (south-bound) (Hilliards Cross junction)

5.3.71 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The junction provides access and egress from/to the A38 southbound on and off-slips. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 29.

Table 29: 2016 baseline performance at Wood Lane/A38(T) Rykneld Street south-bound slip roads junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A38 slip road (south-bound) (left)	253	0.53	1
A38 slip road (south-bound) (right)	38	0.28	0
Wood End Lane (west) (ahead + right)	584	1.11	45
Wood End Lane (west) (ahead)	5	-	-
Wood End Lane (east) (left)	24	-	-
Wood End Lane (east) (ahead)	639	-	-
	2016 PM (17:00 - 18:00) baseline results		
A38 slip road (south-bound) (left)	181	0.34	1
A38 slip road (south-bound) (right)	21	0.26	0
Wood End Lane (west) (ahead + right)	771	1.34	139
Wood End Lane (west) (ahead)	0	-	-
Wood End Lane (east) (left)	21	-	-
Wood End Lane (east) (ahead)	465	-	-

5.3.72 The model shows that this junction operates over its capacity in the AM and PM peak hours with the Wood End Lane (west) arm showing an RFC value of 1.11 in AM and 1.34 in PM peak hours with a corresponding queue length of 45 and 139 PCUs respectively.

A5192 Eastern Avenue/A51 Stafford Road/A51 Western Bypass

5.3.73 This junction is a three-arm signal controlled junction incorporating controlled pedestrian crossing facilities on Eastern Avenue and Stafford Road. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 30.

Table 30: 2016 baseline performance at A5192 Eastern Avenue/A51 Stafford Road junction/A51 Western Bypass junction

Approach	Flow, PCU/hr	DoS	MMQ
	2016 AM (08:00 - 09:00) baseline results		
Exit road from Innkeeper's Lodge Lichfield hotel	4	2%	0
Western Bypass (south) (ahead + right turn)	911	87%	12
A5192 Eastern Avenue (east) (right turn)	272	80%	8
A5192 Eastern Avenue(east) (left turn)	153	19%	2
Stafford Road (north) (ahead)	830	94%	17
Stafford Road (north) (left turn)	580	83%	9
	2016 PM (17:00 - 18:00) baseline results		
Exit road from Innkeeper's Lodge Lichfield Hotel	7	4%	0
Western Bypass (south) (ahead + right turn)	1054	83%	21
A5192 Eastern Avenue (east) (right turn)	406	83%	12
A5192 Eastern Avenue (east) - left turn	240	26%	3
Stafford Road (north) (ahead)	583	102%	15
Stafford Road (north) (left turn)	302	40%	3

5.3.74 The model shows that this junction is operating at capacity with the Stafford Road ahead movements showing a DoS of 94% in the AM peak and 102% in the PM peak and corresponding MMQs of 17 and 15 PCUs respectively.

Blithbury Road/Stoneyford Lane

5.3.75 This junction is a three-arm priority controlled (give way) T-junction with 'kerbed central reserve' facilities with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 31.

Table 31: 2016 baseline performance at Blithbury Road /Stoneyford Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Stoneyford Lane (left + right)	46	0.08	0
Blithbury Road (west) (ahead)	74	-	-
Blithbury Road (west) (right)	29	0.05	0
Blithbury Road (east) (left)	0	-	-
Blithbury Road (east) (ahead)	39	-	-
	2016 PM (17:00 - 18:00) baseline results		
Stoneyford Road (left + right)	31	0.06	0
Blithbury Road (west) (ahead)	41	-	-
Blithbury Road (west) (right)	35	0.06	0
Blithbury Road (east) (left)	2	-	-
Blithbury Road (east) (ahead)	40	-	-

5.3.76 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Blithbury Lane/Hadley Gate

5.3.77 This junction is a three-arm priority controlled (give way) T-junction with 'kerbed central reserve' facilities with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 32.

Table 32: 2016 baseline performance at Blithbury Lane/Hadley Gate junction

Approach	Flow, PCU/ hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Hadley Gate (left + right)	0	0.00	0
Blithbury Lane (east) (ahead)	37	-	-
Blithbury Lane (east) (right)	0	0.00	0
Blithbury Lane (west) (left)	0	-	-
Blithbury Lane (west) (ahead)	76	-	-
	2016 PM (17:00 - 18:00) baseline results		
Hadley Gate (left + right)	0	0.00	0
Blithbury Lane (east) (ahead)	43	-	-
Blithbury Lane (east) (right)	1	0.00	0
Blithbury Lane (west) (left)	1	-	-
Blithbury Lane (west) (ahead)	38	-	-

5.3.78 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Newlands Lane/Moor Lane

5.3.79 This junction is a three-arm priority controlled (give way) T-junction with 'kerbed central reserve' facilities with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 33.

Table 33: 2016 baseline performance at Newlands Lane/Moor Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Moor Lane (left + right)	7	0.01	0
Newlands Lane (north) (ahead + right)	4	0.01	0
Newlands Lane (north) (ahead)	8	-	-
Newlands Lane (south) (left)	5	-	-
Newlands Lane (south) (ahead)	0	-	-
	2016 PM (17:00 - 18:00) baseline results		
Moor Lane (left + right)	7	0.02	0
Newlands Lane (north) (ahead + right)	3	0.01	0
Newlands Lane (north) (ahead)	5	-	-
Newlands Lane (south) (left)	0	-	-
Newlands Lane (south) (ahead)	0	-	-

5.3.80 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A515 Lichfield Road/Common Lane/Shaw Lane

5.3.81 This junction is a four-arm priority controlled (give way) crossroads with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 34.

Table 34: 2016 baseline performance at A515 Lichfield Road/Common Lane/Shaw Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Common Lane (ahead + left + right)	0	0.00	0
A515 Lichfield Road (north) (ahead + left + right)	3	0.00	0
A515 Lichfield Road (north) (left)	2	-	-
A515 Lichfield Road (north) (ahead)	333	-	-
Shawn Lane (ahead + left + right)	7	0.02	0
A515 Lichfield Road (south) (ahead + left + right)	3	0.00	0
A515 Lichfield Road (south) (left)	2	-	-
A515 Lichfield Road (south) (ahead)	212	-	-
	2016 PM (17:00 - 18:00) baseline results		
Common Lane (ahead + left + right)	0	0.00	0
A515 Lichfield Road (north) (ahead + left + right)	0	0.00	0
A515 Lichfield Road (north) (left)	2	-	-
A515 Lichfield Road (north) (ahead)	191	-	-
Shawn Lane (ahead + left + right)	8	0.02	0
A515 Lichfield Road (south) (ahead + left + right)	0	0.00	0
A515 Lichfield Road (south) (left)	4	-	-
A515 Lichfield Road (south) (ahead)	246	-	-

5.3.82 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Accidents and safety

5.3.83 Road traffic collisions are referred to as accidents in this report. This provides consistency of reporting with the HS2 Phase One ES. Accident records have been obtained from the information provided by the SCC. This report considers the three years from 30 April 2012 to 30 April 2015.

5.3.84 Within the Fradley to Colton area, a total of 316 accidents occurred over the three-year period, of which 297 (94.0%) were recorded as slight, 16 (5.1%) as serious and 3 (0.9%) as fatal.

5.3.85 Regarding the roads where accidents occurred, 13.9% of accidents in the Fradley to Colton area were located on the A460, followed by the A51 (12.7%), the A513 (10.4%) and the A515 (8.2%).

5.3.86 There were 76 accidents involving non-motorised users (i.e., pedestrians, cyclists, equestrians or mobility scooters). Most of these pedestrian or cycling-related accidents occurred on the A460 (15.8%) and the A513 (9.2%).

5.3.87 No accident clusters were identified in the Fradley to Colton area (i.e. locations recording nine or more accidents over the three years for which data was analysed).

5.3.88 The baseline survey report (see BID-TR-001-000) illustrates the location of accidents recorded in the Fradley to Colton area over the three years between April 2012 and April 2015. Severity is shown depending on icon colour (green: slight, yellow: serious; red: fatal). Pedestrian icons show pedestrian and cycling related accidents.

Parking and loading

5.3.89 Bromley Hayes Garden Centre is located adjacent to the A515 Lichfield Road and accessed off Shaw Lane, close to the Proposed Scheme. The site has an open, partly-surfaced parking area capable of accommodating, as a broad estimate, more than 40 vehicles for visitors to the Garden Centre and on-site restaurant, with staff parking elsewhere within the facility.

Public transport

5.3.90 Public transport provision is focused on the local centres of Lichfield and Rugeley, with other more rural areas within the Fradley to Colton area being less well served. Lichfield is the main transport hub where bus routes meet, crossing the area along the principal highway corridors, connecting towns, villages and hamlets along the way. Lichfield and Rugeley are each served by two railway stations.

5.3.91 The following sections describe the available public transport provision in the Fradley to Colton area at the time of assessment.

Rail network

5.3.92 The WCML traverses the Fradley to Colton area, with two railway stations serving the area, Lichfield Trent Valley and Rugeley Trent Valley. The WCML is four-tracked between Rugby and Crewe and carries both intercity and local services. Virgin Trains provide inter-city services on the WCML, with two AM services to London and four PM services from London stopping at Lichfield Trent Valley. London Midland operate an hourly service to London during the day, with regular stopping services calling at both Rugeley and Lichfield Trent Valley stations and various other stops between Crewe and London.

5.3.93 London Midland also provide local services from both Lichfield Trent Valley and Rugeley Trent Valley railway stations on two separate lines into Birmingham. Service frequency on the Cross City Line connecting Lichfield Trent Valley and Lichfield City to Redditch via Birmingham New Street is typically two per hour for Lichfield Trent Valley increasing to three per hour during the commuter peaks and four an hour across the day between Lichfield City and Birmingham. From Rugeley Trent Valley to Birmingham, via Rugeley Town and Walsall, there is typically one train per hour, increasing to two trains per hour during the commuter peaks.

5.3.94 Figure B6 (see Annex B) illustrates the rail network in the Fradley to Colton area.

Local bus services

5.3.95 Arriva Midlands is the primary bus operator in south and central Staffordshire. Other operators include: Midland Classic, National Express West Midlands and Select Bus. Further north and towards Cheshire, D&G Bus and First Potteries provide services.

5.3.96 Bus service provision in the Fradley to Colton area focuses on the main urban settlement of Lichfield with nearly all bus services from the surrounding areas terminating at Lichfield bus station, from which onward connections to Birmingham are available. Rugeley operates as a local centre with services from the north and west stopping in Rugeley on the way to Lichfield.

5.3.97 Buses travel through the Fradley to Colton area on their way to Lichfield principally along the following north-south corridors:

- the A38 Rykneld Street corridor from Burton on Trent via Alrewas and Fradley, which is served by four bus services, numbers 7/X7, X12 and 813 which provide connections to Derby, Sutton Coldfield, Tamworth, Barton-under-Needwood and Kings Bromley;
- the A515 Lichfield Road corridor from Burton on Trent via Kings Bromley, which is served by two bus services, numbers 7B/7E and 810; which provide connections to Barton-under-Needwood and Elmhurst;
- the A513 Rugeley Road and B5014 Uttoxeter Road corridor via Handsacre and Armitage which is served by four bus services, numbers L1, 824, 825 and 829, providing connections to Stafford, Rugeley, Stowe, Little Haywood and Hill Ridware; and
- the A51 Stafford Road corridor, via Rugeley and Longdon, served by six bus services, numbers 823, 824, 825, 827, 829 and 842 which provide connections to Stafford, Walsall, Erdington, Colwich, Great Haywood and Hixon.

5.3.98 Further details of the bus services, including route maps and service provision (at the time of assessment) in the Fradley to Colton area is provided in Annex B. Figure B6 illustrates the bus routes and Tables B1 - B4 provide details of the bus service provision.

Public transport interchanges

5.3.99 There are no significant public transport interchange facilities in the Fradley to Colton area. However, at Lichfield City, the railway station and bus station are conveniently located adjacent to facilitate easy interchange between both modes.

Pedestrians, cyclist and equestrians

5.3.100 There are pedestrian footways adjacent to many of the roads in the built up areas of Lichfield, Kings Bromley, Hill Ridware, Pipe Ridware, Blithbury, Colton and Stockwell Heath. There is a network of advisory cycle routes[47], a National Cycle Network (NCN)

[47] Advisory cycle routes are locally promoted routes for use by cyclists that do not generally have any formal cycle infrastructure provision, such as cycle lanes

route and several bridleways in the vicinity of the Proposed Scheme. The following sections identify the pedestrian, cycle and equestrian facilities in the study area.

Pedestrian facilities

Lichfield

5.3.101 In Lichfield, pedestrian footway provision is typical of a built up urban area. Cappers Lane has segregated footways along one side from south of its junction with the A38 Rykneld Street to the A5127 Trent Valley Road roundabout. This provision continues along the A5192 Eastern Avenue around the east and north of Lichfield, in some places with provision on both sides, and with certain sections marked as shared pedestrian and cycle route.

Kings Bromley

5.3.102 Within Kings Bromley village, the roads generally have footways. A515 Yoxall Road includes footways on the eastern side of the carriageway as far as the Church Lane junction. A515 Lichfield Road includes footways on both sides of the carriageway until approximately 70m south of its junction with Crawley Lane, at which point the footway continues on the western side of the carriageway only. This footway continues in a south-west alignment and terminates at the A515 Lichfield Road/A513 Rugeley Road junction. A513 Alrewas Road has footways extending from its junction with A515 Lichfield Road to its junction with Chamberlain Close.

5.3.103 In addition to the pedestrian facilities on the public roads, there are a number of PRoW in the Kings Bromley area. Those in the vicinity of the scheme provide connections between Kings Bromley, Rileyhill and Handsacre, and they are listed below.

Hill Ridware, Pipe Ridware and Blithbury

5.3.104 The B5014 Ridware Road/Uttoxeter Road is the main route running through Mavesyn Ridware parish, and includes continuous footways throughout the village of Hill Ridware, and links north to the smaller village of Blithbury, which has limited footway provision only along Blithbury Road. However, there is no pedestrian provision in Pipe Ridware, which is the smallest of the three settlements, and is linked to Blithbury by Pipe Wood Lane.

5.3.105 In addition to the pedestrian facilities on the public roads, there are a number of PRoW in the Mavesyn Ridware area. Those in the vicinity of the Proposed Scheme providing links between Hill Ridware, Hamstall Ridware and Pipe Ridware, and a network linking Pipe Ridware to Blithbury. These PRoW are listed below.

Colton and Stockwell Heath

5.3.106 The roads within Colton village generally have good quality footways, however, there is no pedestrian provision in Stockwell Heath, which is the smaller of the two neighbouring settlements.

5.3.107 High Street, which leads out of Colton in a north-easterly direction, includes footways as far as approximately 100m north of its junction with Heathway. These footways continue where High Street forms a junction with Bellamour Way, and route in a westerly direction as far as the junction of Bellamour Way and School Lane. A small

footway continues along Bellamour Way on the northern side of the carriageway as far as B5013 Colton Road, however this footway is narrow and of a low quality.

5.3.108 There is a more extensive network of PRoW in the Colton area, primarily linking Colton village to outlying farms. Those in the vicinity of the Proposed Scheme include a number of PRoW in the Stockwell Heath area, and others around Newlands Lane/Blithbury Road are listed below.

Cycle facilities

5.3.109 In the Fradley to Colton area, National Route 54, part of the NCN, passes through the area including along part of Wood End Lane as well as crossing A5192 Eastern Avenue. The towpath of the Trent and Mersey Canal, to the north of Handsacre and Armitage, also provides an off-road cycle route and there are a number of advisory cycle routes which are documented below.

Lichfield

5.3.110 In the Lichfield urban area, there is a limited network of advisory cycle routes, and several segregated cycle paths. One of these runs parallel to the A5192 Cappers Lane/Eastern Avenue between Austin Cote Lane and Netherstowe, linking in to NCN54 towards Fradley and Alrewas. A short section of NCN54 also crosses Wood End Lane, between Netherstowe Lane and Gorse Lane, providing south-west to north-east links.

5.3.111 There is also an advisory route that uses residential roads (Meadowbrook Road, Purcell Avenue, Weston Road, High Grange, Garrick Road and Terry Close which runs parallel to the east-west section of A5192 Eastern Avenue towards the A51. Other routes include a short section of segregated cycle path alongside the A51 Western Bypass.

Kings Bromley

5.3.112 In Kings Bromley, there is a network of advisory cycle routes and these include the following roads:

- A513 Alrewas Road, Fradley Road and Daisy Lane, connecting Kings Bromley and Alrewas;
- A515 Yoxall Road and Trent Lane, connecting Yoxall and Kings Bromley; and
- A513 Lichfield Road, Shaw Lane and Tuppenhurst Lane, connecting Kings Bromley and Handsacre.

Hill Ridware, Pipe Ridware and Blithbury

5.3.113 In the Hill Ridware, Pipe Ridware and Blithbury area, there is a network of advisory cycle routes and these include the following roads:

- Blithbury Road connecting Blithbury and Hamstall Ridware to Yoxall and Rugeley;
- Lichfield Road/Pipe Lane linking Hamstall Ridware, Nethertown and Pipe Ridware to Blithbury; and

- B5014 Uttoxeter Road/Stoneford Lane between Handsacre and Colton via Hill Ridware.

Colton/Stockwell Heath

5.3.114 In the Colton and Stockwell Heath area, there is a network of advisory cycle routes and these include the following roads:

- Hollow Lane and Blithbury Road, connecting to Blithbury and Rugeley;
- High Street, between Colton and Stockwell Heath;
- Newlands Lane and Sherracop Lane, between B5014 Uttoxeter Road and B5013 Uttoxeter Road; and
- Bellamour Lane, between B5013 Uttoxeter Road and A51.

Equestrian facilities

5.3.115 There are five bridleways and one Byway Open to All Traffic (BOAT) in the vicinity of the Proposed Scheme in the Fradley to Colton area, which are listed below. In addition, during engagement between SCC and the North Staffordshire Bridleways Association, the Association did not identify any other routes to be "important to equestrians" in the vicinity of the Proposed Scheme in the Fradley to Colton area.

Public rights of way

5.3.116 The baseline survey report (see BID-TR-001-000) provides a summary of the PRoW survey data within the Fradley to Colton area in close proximity to the Proposed Scheme. For ease of reference the PRoW data has been presented for each parish within the area, from south to north.

5.3.117 The following PRoW are in close proximity to the Proposed Scheme:

- Fradley and Streethay Bridleway 33/Alrewas Bridleway 33 – between Alrewas Hayes (north of the Trent and Mersey Canal) and to Kings Bromley Bridleway 13 via Alrewas Hayes wedding venue;
- Kings Bromley Footpath 0.390 – between the A515 and Shaw Lane, 0.5km north of Rileyhill and Bromley Hayes;
- Kings Bromley Footpath 0.392(a) – between the Alrewas parish boundary and Crawley Lane;
- Kings Bromley Footpath 1 – between Kings Bromley Footpath 2 and Shaw Lane/Rugeley Road junction, Handsacre;
- Kings Bromley Footpath 12 – between Crawley Lane and the A515, 0.5km north of Rileyhill and Bromley Hayes;
- Kings Bromley Bridleway 13 – between Crawley Lane and Alrewas Bridleway 34;
- Mavesyn Ridware Footpath 7 – between Rugeley Road in Blithbury village to the B5014 Uttoxeter Road;

- Mavesyn Ridware Footpath 8 – between Bentley Farm, Rake End and Pipe Wood Lane, just south of Rugeley School;
- Mavesyn Ridware Footpath 9 – between its junction with Footpath 11 to the B5014 Uttoxeter Road;
- Hamstall Ridware Footpath 3 – from Nethertown Road to the Mavesyn Ridware parish boundary;
- Mavesyn Ridware 30 – between Pipe Ridware churchyard and the Hamstall Ridware parish boundary;
- Mavesyn Ridware Footpath 32 – between Pipe Wood Lane, Pipe Ridware and the Hamstall Ridware Parish Boundary;
- Mavesyn Ridware Footpath 33 – between Pipe Wood Lane and Holly Bush Lane, Pipe Ridware;
- Mavesyn Ridware Footpath 38 – between Quinton's Orchard Fish Farm and Pipe Wood Lane, just north of Woodhouse Farm;
- Colton BOAT 16 – between Footpath 15 and Blithbury Road;
- Colton Footpath 17 – between Hadley Gate and Footpath 18 and 19;
- Colton Footpath 19 – between Newlands lane and Footpaths 17 and 18;
- Colton Bridleway 31 – between the Longley Lane/Newlands Lane junction to Colton Bridleway 32 and 33;
- Colton Bridleway 32 – between Longley Lane at its junction with Colton Bridleway ;
- Colton Bridleway 33 – between Hollow Lane to Colton Bridleway 31 and 33;
- Colton Footpath 34 – between Newlands Lane and Footpaths 35 and 37;
- Colton Footpath 36 – between the Newlands Lane/High Street junction and Footpaths 37, 38 and 39;
- Colton Footpath 52 – from Footpaths 50, 51 and 52 in agricultural land to the west of Heathway, as far as Moor Lane, Stockwell Heath;
- Colton Footpath 73 – from several farm properties around the Hollow Lane/Blithbury Road junction to agricultural land located to the east of Newlands Lane; and
- Colton Footpath 76 – between Newlands Lane in Stockwell village to Moor Lane.

Waterways/canals

5.3.118 There are two navigable waterways situated in the Fradley to Colton area, the Trent and Mersey Canal and the Coventry Canal which meet at Fradley junction. On the former canal, there is a canal boat marina located at Bromley Hayes, known as Kings

Bromley Wharf Marina, which has capacity for 275 narrow boats. This lies in close proximity to the Proposed Scheme.

5.3.119 Surveys undertaken as part of the HS2 Phase One baseline assessment indicated a frequency of five boats a day using this stretch of the canal. However, it is understood that the area around Fradley junction and the marina is very popular with tourists during the spring and summer months particularly at weekends.

5.4 Colwich to Yarlet area

Study area

5.4.1 Roads potentially affected by the Proposed Scheme in the Colwich to Yarlet area include the M6, the A34 Stone Road, the A51 Lichfield Road, the A518 Weston Road, the A513 Lichfield Road/Beaconside and the B5066 Sandon Road, as well as local roads serving the communities of Colwich, Great Haywood, Little Haywood, Hixon, Hopton, Salt and Yarlet.

5.4.2 The WCML runs parallel, both to north and south of the Proposed Scheme, with the route of the Proposed Scheme crossing the WCML alignment in the vicinity of Great Haywood. The Trent and Mersey Canal follows the alignment of the northern line of the WCML, with the route of the Proposed Scheme also crossing the Trent and Mersey Canal alignment in the vicinity of Great Haywood. The location of the key transport infrastructure can be found in Figure B2 and Figure B7 (see Annex B).

Local land uses

5.4.3 The Colwich to Yarlet area is predominantly rural in nature, comprising largely of fields, small towns, villages and hamlets including Colwich, Little Haywood, Great Haywood, Tixall, Ingestre, Hixon and Hopton. To the south lies the town of Stafford, with a population of approximately 134,000[48].

Surveys

5.4.4 Initial traffic surveys were undertaken in November and December 2015, with additional surveys undertaken in 2016 in February, March, July and November and further surveys undertaken in March 2017. Non-motorised user surveys were undertaken in 2016 in the months of June, July and November and also in April 2017 to establish the usage of roads and PRoW by pedestrians, cyclists and equestrians in the area of the route of the Proposed Scheme. The survey types and locations are shown in the baseline survey report, alongside the summarised survey data.

Traffic surveys

5.4.5 The traffic surveys comprise of ATCs on links and MCCs and QLSs at junctions across the study area. Where possible ATC data was gathered for a two week period. In total 81 traffic surveys have been undertaken.

5.4.6 In addition to the newly commissioned surveys, existing transport survey data has been obtained from SCC and Highways England, including ATCs and MCCs.

[48] Office for National Statistics (2011), *2011 Census*

Non-motorised user surveys

5.4.7 As appropriate to the role of the PRoW, these surveys covered weekday and weekend use. The surveys included:

- roads and associated footways intersected by the Proposed Scheme and those potentially affected by proposed construction works; and
- PRoW intersected or likely to be affected routes including footpaths, bridleways, cycleways and canal towpaths.

Highway network

Strategic and primary 'A' road network

5.4.8 There is one strategic road which runs through the study area, the M6 motorway.

The M6 runs along a north-south alignment through the north-western section of the Colwich to Yarlet area, and connects Stafford with Stoke-on-Trent in this locality as well as providing links beyond the wider network. The Proposed Scheme will not intersect the M6 in this area. The M6 is managed by Highways England, all other adopted roads within the Colwich to Yarlet area are managed by SCC.

5.4.9 The A34 Stone Road has a north to south alignment and links the towns of Stafford and Stone in this area. The A34 Stone Road also routes via two smaller settlements, Yarlet and Aston-by-Stone. The Proposed scheme will intersect the A34 Stone Road, just north of Yarlet. In this locality the A34 Stone Road is a dual carriageway with a 60mph speed limit. It is expected that the A34 Stone Road will be a primary access route for construction traffic.

5.4.10 The A51 Lichfield Road runs parallel to the River Trent in this study area and connects Stone with Rugeley in a north-east to south-west alignment via a number of smaller settlements including Colwich, Little Haywood, Great Haywood, Weston, Sandon and Burston. The Proposed Scheme will intersect the A51 Lichfield Road just north of Great Haywood, where the road operates as a single lane carriageway with a 60mph speed limit. Speed limits on the A51 Lichfield Road away from the Proposed Scheme are variable and generally less than 60mph, particularly in built up areas. It is expected that the A51 Lichfield Road will be a primary access route for construction traffic.

5.4.11 The A518 Weston Road has a broadly north-east to south-west alignment and links Uttoxeter with Stafford. The A518 Weston Road routes via the Staffordshire County Showground and the village of Weston within the Colwich to Yarlet area. The Proposed Scheme will intersect the A518 Weston Road, just south of the Staffordshire County Showground. For this section of the highway, the A518 Weston Road is a single lane carriageway subject to a 60mph speed restriction, although speed limits on the A518 Weston Road away from the Proposed Scheme are variable and generally less than 60mph, particularly in built up areas. It is expected that the A518 Weston Road will be a primary access route for construction traffic.

5.4.12 Figure B2 (see Annex B) illustrates the strategic, primary and local road network in the Colwich to Yarlet area.

Local road network

5.4.13 The A513 Lichfield Road/Beaconside connects Stafford and the A51 Lichfield Road, just north of Rugeley, and routes through the village of Milford and the northern part of Cannock Chase. The road runs along a north-west to south-east alignment and is a single lane carriageway throughout its length. The A513 Lichfield Road/Beaconside is subject to a 60mph speed restriction for much of its length, with this limit being reduced to 30 or 40mph in residential areas. The A513 Beaconside will not cross the alignment of the Proposed Scheme but it is expected to be used as a primary access route for construction traffic.

5.4.14 The B5066 Sandon Road follows a north to south alignment and connects the A513 Beaconside in Stafford with the A51 Lichfield Road near the village of Sandon. The route also passes through the settlements of Hopton and Salt. The B5066 Sandon Road is a single carriageway subject to a 60mph speed limit for the majority of its length. The B5066 Sandon Road is expected to be used as a route for construction traffic to access a construction compound.

5.4.15 There are a number of lower order roads which are likely to be affected by the Proposed Scheme. These include:

- Tolldish Lane, between A51 Lichfield Road and Moreton Lane; and
- Hoo Mill Lane (private access road), Mill Lane and Ingestre Park Road, at the point where these roads intersect.

Baseline traffic flows

5.4.16 The baseline traffic flows for strategic and primary 'A' roads are summarised for the Colwich to Yarlet area in Table 35 below. Table 36 provides baseline traffic flows for local roads in the area.

Table 35: Colwich to Yarlet strategic and primary 'A' road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
M6 (between M6 junction 14 and junction 13)	SB	3721	698	4286	674	59951	10581
	NB	4316	669	4148	517	63380	9146
A34 from M6 roundabout at Creswell	SB	776	80	806	39	8152	890
	NB	979	92	754	51	8931	1067
A34 Stone Road (between Redhill roundabout and Whitgreave Lane)	NB	684	53	1022	24	9337	547
	SB	1181	61	736	26	10492	616
A34 Stone Road (between Whitgreave Lane and Yarlet Lane)	NB	684	53	1022	24	9337	547
	SB	1181	61	736	26	10492	616
A34 Stone Road (between Yarlet Lane and Stone Road/north-bound)	NB	802	53	1081	25	9967	545
	SB	1258	65	807	25	10930	629
A51 Lichfield Road (between Lichfield Road and Rugeley Eastern Bypass)	WB	958	33	943	19	9741	362
	EB	967	42	1065	28	10412	489
A51 Lichfield Road (between Hoo Mill Lane and the Proposed Scheme)	NB	697	34	594	16	5994	339
	SB	670	43	834	26	6986	473
A51 Lichfield Road (between Little Tixall Lane and Tolldish Lane)	NB	686	31	565	21	5876	337
	SB	631	40	749	23	6483	413
A51 Lichfield Road (between Main Road and Little Tixall Lane)	NB	704	38	573	20	5964	362
	SB	633	42	773	25	6567	414
A51 Lichfield Road (between Tolldish Lane and the Proposed Scheme)	NB	697	34	594	16	5994	339

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	670	43	834	26	6986	473
A51 London Road (between Hoo Mill Lane and New Road)	NB	551	38	488	22	4960	357
	SB	532	44	605	37	5428	485
A51 London Road (between New Road and Stafford Road)	NB	749	54	710	28	6871	521
	SB	632	46	696	27	6255	464
A51 London Road (between Stafford Road and Uttoxeter Road)	NB	866	63	727	28	8380	616
	SB	732	53	890	35	8530	593
A51 London Road (between Uttoxeter Road and Church Lane)	WB	628	45	656	22	5965	449
	EB	661	48	603	17	5872	435
A51 Main Road (between Bellamour Lane and Main Road)	WB	648	15	699	12	6568	191
	EB	653	17	737	13	6986	179
A51 Main Road (between Bishton Lane and Lichfield Road)	NB	637	37	806	22	6891	363
	SB	806	47	776	22	7555	418
A518 Stafford Road/Weston Bank (between A51 London Road and Willowmore Banks)	SB	778	31	454	13	5918	301
	NB	404	38	722	14	5407	355
A518 Weston Bank (between Within Lane and Willowmore Banks)	SB	778	31	454	13	5918	301
	NB	404	38	722	14	5407	355
A518 Weston Road (between Blackheath Lane and Hydrant Way)	WB	1097	28	752	13	8927	184
	EB	707	17	1032	15	9146	217
A518 Weston Road (between Proposed Scheme and Blackheath Lane)	SB	642	25	446	22	5934	359

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A518 Weston Road (between Within Lane and the Proposed Scheme)	NB	365	21	713	15	5879	275
	SB	810	32	461	13	6426	311
	NB	356	35	665	12	5163	323

Table 36: Colwich to Yarlet local road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A5013 Eccleshall Road (between Whitgreave Lane and M6 junction 14)	NB	448	19	564	13	5327	228
	SB	512	18	459	5	4990	225
A513 Beaconside (between Dyson Way and B5066 Sandon Road)	NB	505	22	815	19	6876	297
	SB	878	31	588	23	7641	389
A513 Beaconside (between Marston Lane and Redhill roundabout)	WB	726	49	917	28	8514	547
	EB	993	50	662	32	8576	587
A513 Beaconside (between B5066 Sandon Road and Marston Lane)	WB	594	39	703	18	7069	403
	EB	772	42	582	27	7381	482
A513 Beaconside (between B5066 Sandon Road and B5066 Sandon Road/south-bound)	NB	999	48	710	36	8758	591
	SB	666	32	1041	53	8748	595
A513 Beaconside (between A518 Weston Road and Dyson Way)	NB	826	18	755	10	7591	113
	SB	689	15	863	17	7969	198
A513 Lichfield Road (between Tixall Road and Lichfield Road/eastern roundabout)	WB	367	2	453	2	4145	29
	EB	485	5	395	3	4231	44
A518 Stafford Bank (between London Road and Willowmore Banks)	SB	778	31	454	13	5918	301
	NB	404	38	722	14	5407	355
A518 Weston Bank (between Within Lane and Willowmore Banks)	SB	778	31	454	13	5918	301
	NB	404	38	722	14	5407	355
A518 Weston Road (between Blackheath Lane and Hydrant Way)	WB	1097	28	752	13	8927	184

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	EB	707	17	1032	15	9146	217
A518 Weston Road (between Proposed Scheme and Blackheath Lane)	SB	642	25	446	22	5934	359
	NB	365	21	713	15	5879	275
A518 Weston Road (between Within Lane and the Proposed Scheme)	SB	810	32	461	13	6426	311
	NB	356	35	665	12	5163	323
B5066 Sandon Bank (between A51 Lichfield Road and Salt Lane)	NB	187	16	419	7	2556	127
	SB	522	17	198	10	3035	153
B5066 Sandon Road (between A513 Beaconside and Hopton Lane)	NB	219	13	419	5	2708	110
	SB	494	13	179	4	2861	108
B5066 Sandon Road (between Hopton Lane and the Proposed Scheme)	NB	205	12	404	4	2547	104
	SB	475	12	174	4	2715	103
B5066 Sandon Road (between Proposed Scheme and Within Lane)	NB	205	12	404	4	2547	104
	SB	475	12	174	4	2715	103
B5066 Sandon Road (between Salt Bank and Within Lane)	NB	187	16	419	7	2556	127
	SB	522	17	198	10	3035	153
Great Haywood Road (between Ingestre Park Road and Holdiford Road)	WB	242	3	121	1	1972	23
	EB	100	3	196	1	1604	26
Mill Lane (between Hoo Mill Lane (private access road) and Mill Lane/west-bound of Main Road)	NB	255	2	118	1	2029	22
	SB	115	3	198	1	1704	34
Mill Lane (between Mill Lane/west-bound of Main Road and Main Road)	WB	235	0	170	1	2066	6

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	EB	145	0	240	1	2057	7
Tixall Road (between Holdiford Road and Hanyards Lane)	EB	177	3	461	2	3069	23
	WB	476	4	217	1	2992	26
Whitgreave Lane (between A34 Stone Road and Green Lane)	NB	25	1	41	0	330	8
	SB	57	2	26	0	344	8
Coley Lane (between Main Road and Little Tixall Lane)	EB	33	0	60	0	496	2
	WB	66	1	35	0	504	2
Blackheath Lane (north of Tixall Road)	SB	345	6	775	4	5843	62
	NB	726	5	361	2	5159	27
Blackheath Lane (south of A518 Weston Road)	SB	333	5	758	4	5647	49
	NB	732	3	470	4	5888	36
Main Road (between A51 Lichfield Road and Mill Lane)	SB	186	3	266	1	2042	20
	NB	205	6	170	4	1969	59
Main Road (between Lichfield Road and Meadow Lane)	NB	118	1	120	0	1371	9
	SB	104	1	137	0	1385	9
Main Road (between Meadow Lane and Trent Lane)	NB	118	1	120	0	1371	9
	SB	104	1	137	0	1385	9
Yarlet Lane (close to A34 Stone Road)	SEB	22	1	6	0	108	4
	NWB	6	0	6	0	47	1
Yarlet Lane (close to Marston Lane)	SEB	18	1	2	0	68	4

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	NWB	2	0	5	0	26	1
Salt Road (between B5066 Sandon Road and A518 Weston Bank)	EB	29	0	44	0	268	2
	WB	35	1	37	0	408	4
Hopton Lane (between Wilmore Hill and the Proposed Scheme)	WB	19	0	13	0	151	0
	EB	9	0	13	0	116	1
Hopton Lane (east of B5066 Sandon Road)	WB	25	1	8	0	202	7
	EB	15	1	19	0	206	3
Hanyards Lane (east of Tixall Road)	NB	4	0	3	0	52	1
	SB	4	1	1	0	46	3
Ingestre Park Road (between Hoo Mill Lane (private access road) and Trent Walk)	NB	37	1	32	0	483	10
	SB	41	2	27	0	473	11
Marston Lane (between Yarlet Lane and A513 Beaconside)	SB	31	2	6	0	155	8
	NB	6	0	14	0	85	3
Marston Lane (east of Yarlet Lane)	EB	5	1	7	0	49	3
	WB	13	1	4	0	73	3
Within Lane (between B5066 Sandon Road and Wilmore Hill Lane)	EB	162	5	127	5	1261	49
	WB	118	7	86	2	891	44
Tolldish Lane (east of A51 Lichfield Road)	EB	7	0	5	0	66	2
	WB	6	0	5	0	60	1

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
Hoo Mill Lane (private access road) (between Ingestre Park Road and Hoo Mill Lane/east-bound)	EB	1	0	1	0	18	0
	WB	1	1	1	0	22	2
Hoo Mill Lane (private road) (between Lichfield Road and Hoo Mill Lane/east-bound)	EB	1	0	1	0	18	0
	WB	1	1	1	0	22	2

Junction operation

5.4.17 The operation of the key junctions that could be affected by the Proposed Scheme works, or will potentially be used as the main access routes from the SRN through the study area to the construction sites, have been assessed and the results are summarised below.

5.4.18 Junctions 9 software[49] has been used to calculate the existing capacity of all priority controlled junctions within the study area. LINSIG software[50] has been used to calculate the existing capacity of all signal controlled junctions.

5.4.19 Junctions 9 calculates the RFC and queue for each approach to a junction. The RFC indicates the likely performance of a junction under a given set of traffic flows and the queue represents a typical queue found at the end of each time segment within the modelled time period. LINSIG calculates the Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) for each approach under a given set of traffic flows, with the MMQ the average maximum queue modelled within each traffic signal cycle.

5.4.20 At over 85% to 90% DoS or 0.85 to 0.9 RFC, queues are likely to increasingly occur. Consequently permanent highway infrastructure is generally designed to stay below this level. At over 100% DoS or 1.0 RFC, if sustained over time, the level of traffic cannot be accommodated. This is referred to as 'theoretical maximum capacity'. In congested urban areas, junctions often operate at or above the theoretical capacity for short periods.

5.4.21 Where two DoS values are presented in the results tables, this provides the value for both the approach lane and its respective flare. All queue lengths and traffic flow inputs to both the LINSIG and Junctions 9 models are presented in PCUs.

5.4.22 The results for the Colwich to Yarlet area are presented in the order of roundabout junctions, priority controlled (give-way) and signalised junctions.

A51 Lichfield Road/A51 Rugeley Eastern Bypass/A460 Wolseley Bridge Road

5.4.23 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 37 below.

[49] TRL Software (undated), *TRL Junctions 9*, https://trlsoftware.co.uk/products/junction_signal_design/junctions_9
[50] JCT Consultancy (undated), *LINSIG Software*, http://www.jctconsultancy.co.uk/Software/LinSigV3/linsigv3.php

Table 37: 2016 baseline performance at A51 Lichfield Road/A51 Rugeley Eastern Bypass/A460 Wolseley Bridge Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Lichfield Road (west)	1012	0.52	1
A51 Rugeley Eastern Bypass (east)	549	0.35	1
A460 Wolseley Bridge Road	682	0.44	1
	2016 PM (17:00 - 18:00) baseline results		
A51 Lichfield Road (west)	1101	0.55	1
A51 Rugeley Eastern Bypass (east)	867	0.60	2
A460 Wolseley Bridge Road	464	0.32	1

5.4.24 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Lichfield Road/A513 Lichfield Road

5.4.25 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The junction includes a left turn filter lane between the A51 Lichfield Road (north) and the A513 Lichfield Road (east). The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 38.

Table 38: 2016 baseline performance at A51 Lichfield Road/A513 Lichfield Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 – 09:00) baseline results		
A51 Lichfield Road (north)	748	0.06	0
A51 Lichfield Road (east)	1020	0.44	1
A513 Lichfield Road	376	0.35	1
	2016 PM (17:00 - 18:00) baseline results		
A51 Lichfield Road (north)	808	0.05	0
A51 Lichfield Road (east)	1046	0.45	1
A513 Lichfield Road	397	0.39	1

5.4.26 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A518 Weston Road/Beacon Way/Blackheath Lane

5.4.27 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The junction includes a left turn filter lane between Blackheath Lane and the A518 Weston Road (south). The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 39.

Table 39: 2016 baseline performance at A518 Weston Road/Beacon Way/Blackheath Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A518 Weston Road (north)	665	0.62	2
Blackheath Lane	763	0.15	0
A518 Weston Road (south)	462	0.27	0
Beacon Way	53	0.04	0
	2016 PM (17:00 - 18:00) baseline results		
A518 Weston Road (north)	538	0.57	1
Blackheath Lane	419	0.13	0
A518 Weston Road (south)	1224	0.70	2
Beacon Way	122	0.18	0

5.4.28 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A518 Weston Road/A513 Beaconside

5.4.29 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 40.

Table 40: 2016 baseline performance at A518 Weston Road/A513 Beaconside junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A513 Beaconside	698	0.48	1
A518 Weston Road (east)	1127	0.68	2
Hydrant Way	23	0.03	0
A518 Weston Road (west)	665	0.47	1
	2016 PM (17:00 - 18:00) baseline results		
A513 Beaconside	987	0.71	2
A518 Weston Road (east)	800	0.49	1
Hydrant Way	13	0.01	0
A518 Weston Road (west)	732	0.49	1

5.4.30 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A513 Beaconside/A34 Stone Road/A34 from M6 roundabout at Creswell

5.4.31 This junction is a four-arm roundabout junction with a signal controlled pedestrian crossing facility on the A513 Beaconside (west) arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 41.

Table 41: 2016 baseline performance at A513 Beaconside/A34 Stone Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A34 Stone Road (north)	1291	0.79	4
A513 Beaconside (east)	1059	0.90	8
A34 Stone Road (south)	621	0.41	1
A34 from M6 roundabout at Creswell (west)	1003	0.52	1
	2016 PM (17:00 - 18:00) baseline results		
A34 Stone Road (north)	813	0.48	1
A513 Beaconside (east)	1166	0.89	7
A34 Stone Road (south)	761	0.51	1
A34 from M6 roundabout at Creswell (west)	1052	0.59	2

5.4.32 The model shows that this junction is operating close to capacity on the A513 Beaconside (east) arm in the AM and PM Peak period, with RFC values of approximately 0.9. The model calculates corresponding queue lengths of eight and seven in the AM and PM Peak periods respectively.

A34 from M6 roundabout at Creswell/Mustang Drive

5.4.33 This junction is a three-arm roundabout junction with a signal controlled pedestrian crossing facility on the A34 from M6 roundabout at Creswell (west) arm. The junction includes a left turn filter lane between the A34 from M6 roundabout at Creswell (east) and Mustang Drive. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 42.

Table 42: 2016 baseline performance at A34 from M6 roundabout at Creswell/Mustang Drive junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A34 from M6 roundabout at Creswell (west)	1212	0.58	2
Mustang Drive	107	0.08	0
A34 from M6 roundabout at Creswell (east)	1104	0.52	1
	2016 PM (17:00 - 18:00) baseline results		
A34 from M6 roundabout at Creswell (west)	1084	0.51	1
Mustang Drive	263	0.19	0
A34 from M6 roundabout at Creswell (east)	1067	0.52	1

5.4.34 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/Church Lane/A51 Lichfield Road/Hoo Mill Lane

5.4.35 This junction is a three-arm priority controlled (give way) T-junction with 'ghost island' right turn facilities, with no controlled pedestrian crossing facilities. Hoo Mill Lane is a private access road with very low traffic flow and is therefore not included in the junction model. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 43.

Table 43: 2016 baseline performance at A51 London Road/Church Lane/A51 Lichfield Road/Hoo Mill Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Church Lane (left + right)	188	0.41	1
A51 Lichfield Road (south-east) (ahead)	470	-	-
A51 Lichfield Road (south-east) (right)	157	0.30	0
A51 London Road (north-west) (left)	41	-	-
A51 London Road (north-west) (ahead)	471	-	-
	2016 PM (17:00 - 18:00) baseline results		
Church Lane (left + right)	266	0.64	2
A51 Lichfield Road (south-east) (ahead)	461	-	-
A51 Lichfield Road (south-east) (right)	143	0.29	0
A51 London Road (north-west) (left)	8	-	-
A51 London Road (north-west) (ahead)	613	-	-

5.4.36 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/Pasturefields Lane

5.4.37 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 44.

Table 44: 2016 baseline performance at A51 London Road/Pasturefields Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Pasturefields Lane (left + right)	11	0.03	0
A51 London Road (south-east) (ahead + right)	14	0.02	0
A51 London Road (south-east) (ahead)	476	-	-
A51 London Road (north-west) (left)	3	-	-
A51 London Road (north-west) (ahead)	511	-	-
	2016 PM (17:00 - 18:00) baseline results		
Pasturefields Lane (left + right)	0	0.00	0
A51 London Road (south-east) (ahead + right)	2	0.00	0
A51 London Road (south-east) (ahead)	503	-	-
A51 London Road (north-west) (left)	0	-	-
A51 London Road (north-west) (ahead)	623	-	-

5.4.38 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A513 Beaconside/B5066 Sandon Road (east)

5.4.39 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 45.

Table 45: 2016 baseline performance at A513 Sandon Road/B5066 Sandon Road (east) junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
B5066 Sandon Road (left)	358	1.04	18
B5066 Sandon Road (right)	212	1.02	12
A513 Beaconside (south) (ahead)	558	-	-
A513 Beaconside (south) (right)	149	0.31	1
A513 Beaconside (north) (left)	115	-	-
A513 Beaconside (north) (ahead)	656	-	-
	2016 PM (17:00 - 18:00) baseline results		
B5066 Sandon Road (left)	137	0.29	0
B5066 Sandon Road (right)	106	0.6	2
A513 Beaconside (south) (ahead)	646	-	-
A513 Beaconside (south) (right)	291	0.61	2
A513 Beaconside (north) (left)	201	-	-
A513 Beaconside (north) (ahead)	574	-	-

5.4.40 The model shows that this junction operates over capacity in the AM peak period with RFC values of over 1 on the B5066 Sandon Road. The junction operates within capacity in the PM peak.

Tixall Road/Hanyards Lane

5.4.41 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 46.

Table 46: 2016 baseline performance at Tixall Road/Hanyards Lane junction

	Flow, PCU/hr	RFC	Queue, PCU
Approach	**2016 AM (08:00 - 09:00) baseline results**		
Hanyards Lane (left + right)	8	0.02	0
Tixall Road (west) (ahead + right)	9	0.01	0
Tixall Road (west) (ahead)	526	-	-
Tixall Road (east) (left)	3	-	-
Tixall Road (east) (ahead)	196	-	-
	2016 PM (17:00 - 18:00) baseline results		
Hanyards Lane (left + right)	0	0	0
Tixall Road (west) (ahead + right)	0	0	0
Tixall Road (west) (ahead)	245	-	-
Tixall Road (east) (left)	0	-	-
Tixall Road (east) (ahead)	418	-	-

5.4.42 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A513 Beaconside/Marston Lane

5.4.43 This junction is a four-arm priority controlled staggered junction with no controlled pedestrian crossing facilities. The junction incorporates 'ghost island' right turning provision. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 47.

Table 47: 2016 baseline performance at A513 Beaconside/Marston Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Marston Lane (left + right)	43	0.27	0
A513 Beaconside (west) (left)	9	-	-
A513 Beaconside (west) (ahead)	871	-	-
A513 Beaconside (west) (ahead)	260	-	-
A513 Beaconside (west) and Marston Lane (ahead)	880	-	-
A513 Beaconside (west) and Marston Lane (right)	275	0.56	1
Common Road (left)	189	0.38	1
Common Road (right)	14	0.14	0

Approach	Flow, PCU/hr	RFC	Queue, PCU
A513 Beaconside (east) (left)	71	-	-
A513 Beaconside (east) (ahead)	651	-	-
A513 Beaconside (east) (ahead)	7	-	-
Common Road and A513 Beaconside (east) (ahead)	836	-	-
Common Road and A513 Beaconside (east) (right)	11	0.03	0
	2016 PM (17:00 - 18:00) baseline results		
Marston Lane (left + right)	15	0.06	0
A513 Beaconside (west) (left)	11	-	-
A513 Beaconside (west) (ahead)	628	-	-
A513 Beaconside (west) (ahead)	95	-	-
A513 Beaconside (west) and Marston Lane (ahead)	631	-	-
A513 Beaconside (west) and Marston Lane (right)	100	0.23	0
Common Road (left)	244	0.57	1
Common Road (right)	31	0.22	0
A513 Beaconside (east) (left)	40	-	-
A513 Beaconside (east) (ahead)	871	-	-
A513 Beaconside (east) (ahead)	6	-	-
Common Road and A513 Beaconside (east) (ahead)	1105	-	-
Common Road and A513 Beaconside (east) (right)	16	0.03	0

5.4.44 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

B5066 Sandon Road/Hopton Lane

5.4.45 This junction is a three-arm priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 48.

Table 48: 2016 baseline performance at B5066 Sandon Road/Hopton Lane junction

Approach	Flow, PCU /hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Hopton Lane (left + right)	21	0.05	0
B5066 Sandon Road (south) (ahead + right)	20	0.03	0
B5066 Sandon Road (south) (ahead)	233	-	-
B5066 Sandon Road (north) (left)	6	-	-
B5066 Sandon Road (north) (ahead)	515	-	-
	2016 PM (17:00 - 18:00) baseline results		
Hopton Lane (left + right)	9	0.02	0
B5066 Sandon Road (south) (ahead + right)	34	0.04	0
B5066 Sandon Road (south) (ahead)	445	-	-
B5066 Sandon Road (north) (left)	4	-	-
B5066 Sandon Road (north) (ahead)	213	-	-

5.4.46 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Lichfield Road/Tolldish Lane

5.4.47 This junction is a four-arm priority controlled crossroad junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 49.

Table 49: 2016 baseline performance at A51 Lichfield Road/Tolldish Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Tolldish Lane (east) (ahead + left + right)	8	0.04	0
A51 Lichfield Road (north) (left)	1	-	-
A51 Lichfield Road (north) (ahead)	609	-	-
A51 Lichfield Road (north) (right)	149	0.33	1
Little Tixall Lane (west) (ahead + left)	150	0.36	1
Little Tixall Lane (west) (ahead + right)	77	0.39	1
A51 Lichfield Road (south) (left)	72	-	-
A51 Lichfield Road (south) (ahead)	675	-	-
A51 Lichfield Road (south) (right)	5	0.01	0
	2016 PM (17:00 - 18:00) baseline results		
Tolldish Lane (east) (ahead + left + right)	8	0.04	0
A51 Lichfield Road (north) (left)	4	-	-
A51 Lichfield Road (north) (ahead)	746	-	-
A51 Lichfield Road (north) (right)	185	0.38	1
Little Tixall Lane (west) (ahead + left)	106	0.21	0
Little Tixall Lane (west) (ahead + right)	43	0.22	0
A51 Lichfield Road (south) (left)	76	-	-
A51 Lichfield Road (south) (ahead)	554	-	-
A51 Lichfield Road (south) (right)	2	0.01	0

5.4.48 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/A518 Stafford Road

5.4.49 This junction is a three-arm signal control junction with pedestrian crossing facilities on the A518 Stafford Road arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 50.

Table 50: 2016 baseline performance at A51 London Road/A518 Stafford Road junction

Approach	Flow, PCU/hr	DoS	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A518 Stafford Road	442	74%	7
A51 London Road (south) (left turn)	305	74%	8
A51 London Road (south) (ahead)	510	58%	6
A51 London Road (north) (ahead)	462	35%	5
A51 London Rd (north) (right turn)	516	72%	12
	2016 PM (17:00 - 18:00) baseline results		
A518 Stafford Road	687	69%	7
A51 London Road (south) (left turn)	202	54%	5
A51 London Road (south) (ahead)	519	66%	7
A51 London Road (north) (ahead)	446	44%	7
A51 London Road (north) (right turn)	318	70%	8

5.4.50 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches. A513 Beaconside/B5066 Sandon Road (west).

5.4.51 This junction is a three-arm signal control junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 51 below.

Table 51: 2016 baseline performance at A513 Beaconside/B5066 Sandon Road junction

Approach	Flow, PCU/hr	DoS	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A513 Sandon Road (north)	992	74%	14
B5066 Sandon Road (west)	494	61%	6
A513 Beaconside (south) (left turn)	198	22%	3
A513 Beaconside (south) (ahead)	430	92%	15
	2016 PM (17:00 - 18:00) baseline results		
A513 Sandon Road (north)	700	96%	14
B5066 Sandon Road (west)	431	102%	18
A513 Beaconside (south) (left turn)	345	28%	3
A513 Beaconside (south) (ahead)	717	67%	14

5.4.52 The model shows that this junction is operating at or close to capacity with the A513 Beaconside arm showing a DoS of 92% in the AM peak and a corresponding MMQ of 15 PCUs, the B5066 Sandon Road arm DoS of 102% in the PM peak and a corresponding MMQ of 18 PCUs.

Tixall Road/Blackheath Road/Baswich Lane

5.4.53 This junction is a four-arm signal control junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 52 below.

Table 52: 2016 baseline performance at Tixall Road/Blackheath Road/Baswich Lane junction

Approach	Flow, PCU/hr	DoS	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Blackheath Lane (north)	374	92%	14
Tixall Road (east)	534	74%	13
Baswich Lane (south)	586	95%	21
Tixall Road (west)	198	78%	6
	2016 PM (17:00 - 18:00) baseline results		
Blackheath Lane (north)	750	83%	19
Tixall Road (east)	249	83%	8
Baswich Lane (south)	336	82%	10
Tixall Road (west)	370	101%	20

5.4.54 The model shows that this junction is operating close to capacity with: the Blackheath Lane arm showing a DoS of 92% in the AM peak period and a corresponding MMQ of 14 PCUs; the Baswich Lane arm showing a DoS of 95% in the AM peak period and a corresponding MMQ of 21 PCUs; and the Tixall Road east-bound arm showing a DoS of 101% in the PM peak period with a corresponding MMQ of 20 PCUs.

M6 junction 14

5.4.55 The AM and PM peak periods have been assessed at junction 14 of the M6, using the M6 junctions 13 - 15 SATURN model during the AM and PM hours as shown in Table 53, for the 2012 model baseline year.

Table 53: 2012 baseline performance at M6 junction 14

Approach	Flow, PCU/hr	V/C[51]	Queue, PCU
	2012 AM (08:00 - 09:00) baseline results		
M6 (south-bound off-slip)	609	49%	4
M6 (south-bound on-slip)	975	46%	0
M6 (north-bound off-slip)	1002	50%	3
M6 (north-bound on-slip)	494	24%	0
A34 (east-bound)	1150	34%	0
A34 (west-bound)	962	43%	0
A5013 Eccleshall Road (east-bound)	724	40%	0
A5013 Eccleshall Road (west-bound)	537	30%	0
A5013 Creswell Grove (east-bound)	748	79%	1
A5013 Creswell Grove (west-bound)	515	37%	0
	2012 PM (17:00 - 18:00) baseline results		
M6 (south-bound off-slip)	369	45%	3
M6 (south-bound on-slip)	878	43%	0
M6 (north-bound off-slip)	827	42%	3
M6 (north-bound on-slip)	626	31%	0
A34 (east-bound)	849	25%	0
A34 (west-bound)	1021	40%	0
A5013 Eccleshall Road (east-bound)	435	24%	0
A5013 Eccleshall Road (west-bound)	771	43%	0
A5013 Creswell Grove (east-bound)	573	62%	1
A5013 Creswell Grove (west-bound)	774	56%	0

5.4.56 The model results show that the junction operates within capacity during the 2012 baseline.

Accidents and safety

5.4.57 Road traffic collisions are referred to as accidents in this report. This provides consistency of reporting with the HS2 Phase One ES. Accident records have been obtained from the information provided by SCC. This report considers the three years from 30 April 2012 to 30 April 2015.

5.4.58 Within the Colwich to Yarlet area, a total of 512 accidents occurred over the three year period, of which 470 (91.8%) were recorded as slight, 39 (7.6%) as serious and 3 (0.6%) as fatal.

[51] V/C refers to the volume over capacity ratio and is a measure of the approach arm traffic volume in relation to its capacity

5.4.59 Regarding the roads where accidents occurred, 22.5% of the accidents within the Colwich to Yarlet area were located on the A34 Stone Road, followed by the A518 Weston Road (12.3%), the A513 Beaconside (8.2%) and the M6 (5.7%).

5.4.60 There were 145 accidents involving non-motorised users (i.e., pedestrians, cyclists, equestrians or mobility scooters). Most of these pedestrian and cycling-related accidents occurred on the A34 Stone Road (17.2%), A518 Weston Road (11.7%) and A449 Stratford Road (6.9%).

5.4.61 Two accident clusters were identified in the Colwich to Yarlet area, located on A513 Beaconside junction with the A34 Stone Road in Stafford (nine accidents over the three years) and on the A34 Lichfield Road junction with Riverway (12 accidents over the three years). Table 54 below provides further details of these accident clusters including severity and the number of accidents involving pedestrians or cyclists.

Table 54: Accident clusters within the Colwich to Yarlet area

Location	Severity				Accidents with pedestrians/cyclists involved
	Accidents	Slight	Serious	Fatal	
A513 Beaconside junction with the A34 Stone Road (Stafford)	9	8	0	1	1
A34 Lichfield Road junction with the Riverway (Stafford)	12	12	0	0	3

5.4.62 Table 54 summarises that most accidents within the clusters were recorded as slight and one as a fatal accident over the three years from April 2012 to April 2015.

5.4.63 The baseline survey report (see BID-TR-001-000) illustrates the location of every accident recorded in the Colwich to Yarlet area over the three years between April 2012 and April 2015. Severity is shown depending on icon colour (green: slight, yellow: serious; red: fatal). Pedestrian icons show pedestrian and cycling related accidents.

Parking and loading

5.4.64 The Staffordshire County Showground is located in this area. The Showground has parking provision for up to 4,000 cars in mainly unmarked spaces. This includes 160 marked parking spaces adjacent to the Member's Pavilion (including six disabled spaces), the 'Red' and 'Blue' permit holders car parks south of the main showground and the Weston car parks north of the showground, all to the east of the A518 Weston Road. In addition, there is a further 20 acres of 'overflow' car parking across the A518 Weston Road, which is linked to the main site by a pedestrian subway.

5.4.65 Great Haywood Marina is located between the Proposed Scheme and to the west of Great Haywood village. The marina has 23 marked parking bays, including two designated user bays adjacent to the main marina building. The marina also provides parking provision for approximately 100 vehicles in mainly unmarked spaces around the perimeter of the site.

Public transport

5.4.66 Public transport provision is focused on the local centres of Stafford and Stone (located in the Stone and Swynnerton area), with more rural areas within the area being less well served. There are also daily (Monday to Saturday) bus services to other localities in the Colwich to Yarlet area including Little Haywood, Great Haywood, Tixall and Hopton.

5.4.67 The following sections describe the available public transport provision in the Colwich to Yarlet area at the time of assessment.

Rail network

5.4.68 The WCML runs parallel to the Trent Valley and traverses the Colwich to Yarlet area along a north-west to south-east alignment. At Colwich junction the WCML splits into two separate lines, the Trent Valley Line and the Macclesfield to Colwich Line. The former heads westwards to Stafford, the latter takes a north-west route towards Stone. The two lines converge at Stone Railway Station (located in the Stone and Swynnerton area).

5.4.69 There are no existing stations in the Colwich to Yarlet area but WCML services stop at Stafford with onward connections to major national destinations including London, Birmingham and Manchester. Rail users can interchange at Stafford for regional and local destinations.

5.4.70 Figure B7 (see Annex B) illustrates the rail network in the Colwich to Yarlet area.

Local bus services

5.4.71 Bus service provision in the Colwich to Yarlet area is concentrated on the major urban settlement of Stafford, with nearly all bus services from surrounding areas terminating here. Rugeley and Stone effectively operate as second tier centres with a number of services travelling to Stafford via these stops. The key corridors are as follows:

- Buses travelling through the Colwich to Yarlet area on their way to and from Stafford, Stone and Rugeley, generally use four corridors that cross the route of the Proposed Scheme in this area. These are: A513 Main Road/A34 Lichfield Road, which is served by three bus services. Numbers 824, 825 and 829 which provide connections to Rugeley, Handsacre, Armitage, Little Haywood and Colwich;
- A51 Lichfield Road (Rugeley to Stone), which is served by three bus services. Numbers 827, 841/841A and 842 which provide connections to Rugeley, Uttoxeter, Great Haywood, Little Haywood, Weston and Hixon;
- A34 Stone Road which is served by one bus service. The number 101 provides connections to Stoke-on-Trent, Yarlet and Whitgreave;
- A518 Weston Road which is served by two bus services. Numbers 827 and 842 provide connections to Rugeley, Weston, Hixon, Little Haywood and Brereton; and

- B5066 Sandon Road is served by two bus services – Numbers 15 and 842/842A, which provide connections to Hopton, Salt and Sandon.

5.4.72 Further details of the bus services, including route maps and service provision (at the time of assessment) in the Colwich to Yarlet area is provided in Annex B. Figure B7 illustrates the bus routes and Tables B5 - B9 provide details of the bus service provision.

Public transport interchanges

5.4.73 There are no significant public transport interchanges in the Colwich to Yarlet area. However, in Stafford the bus and railway stations are conveniently located in close proximity to facilitate easy interchange between these modes.

Pedestrians, cyclists and equestrians

5.4.74 There are pedestrian footways adjacent to many of the roads in the built up areas of Stafford, Colwich, Little Haywood, Great Haywood, Hopton, Yarlet and Weston. There are a network of advisory cycle routes, a NCN route and several bridleways in the vicinity of the Proposed Scheme. The following sections identify the pedestrian, cycle and equestrian facilities in the study area.

Pedestrian facilities

Stafford

5.4.75 In Stafford, the extensive pedestrian footway provision is typical of a built up urban area. Along the A513 Beaconside, there is a footpath that runs along much of the southern edge of the road, from the A518 Weston Road roundabout to the A34 Stone Road roundabout.

Colwich/Little Haywood

5.4.76 Within Colwich and Little Haywood, the roads generally have footways. Main Road includes footways on both sides of the carriageway as far as the junction with the A51 Lichfield Road to the east. These footways continue on the A51 Lichfield Road in a south-easterly direction towards Wolseley Bridge. The footways on Main Road continue to the west, providing a continuous pedestrian route to Great Haywood. Coley Lane also includes footways as far as the Manor Farm Road junction, providing pedestrian access to the residential area to the north.

5.4.77 In addition to the pedestrian facilities on the public highway, there are a number of PRoW in the Colwich and Little Haywood area. Those in the vicinity of the Proposed Scheme provide connections to, amongst other places, Great Haywood, Ingestre, Hixon and Swansmoor. These are listed below.

Great Haywood

5.4.78 Within Great Haywood, the majority of roads have footway provision. The footways on Main Road extend from its junction with A51 Lichfield Road, throughout Great Haywood, and continue in a south-easterly alignment into Little Haywood.

5.4.79 Little Tixall Lane includes footways that extend from its junction with Main Road, to the edge of the residential area to the east. Similarly, Mill Lane has footways that extend from Main Road to the edge of the residential area to the west.

5.4.80 In addition to the pedestrian facilities on the public highway, there are a number of PRoW in the Great Haywood area. Those in the vicinity of the Proposed Scheme provide connections to, amongst other places, Little Haywood, Swansmoor, Pasturefields and Hixon and are listed below.

Hopton

5.4.81 There is no footway provision in Hopton except in the residential cul-de-sacs of Kings Drive and Battle Ridge. These footways only serve as pedestrian access to residential properties and do not extend beyond the residential enclaves.

5.4.82 Despite the absence of pedestrian facilities on the public roads, there are a number of PRoW in the Hopton area that provide connections to Stafford, Marston, Stone, Salt and the Staffordshire County Showground.

Yarlet

5.4.83 Due to its rural nature and being located on the A34 Stone Road, there is limited footway provision in Yarlet. Footways are provided on the A34 Stone Road to the north and south, which connects Yarlet to Stafford and Aston-by-Stone. However, footways are provided on the eastern side of the carriageway but they and are very narrow and of a low quality.

5.4.84 Despite the limited pedestrian facilities on the public roads, there are several PRoW in the Yarlet area, which provide connections to Whitgreave and Marston.

Weston

5.4.85 The majority of roads have footway provision and the Trent and Mersey Canal tow path passes through the village. The A51 Lichfield Road has a footway on both the east and west sides. Five different PRoW routes pass through or begin at Weston. These routes connect Weston to settlements including Hixon and Gayton.

Cycle facilities

Stafford

5.4.86 The NCN 5 routes, off-road, along much of the southern side of the A513 Beaconside and then on-road along Marston Lane. The route will intersect the Proposed Scheme at Marston Lane.

Colwich/Little Haywood

5.4.87 In the Colwich and Little Haywood area, the canal towpath running adjacent to the south of Main Road provides an off-road cycle route, which links with Rugeley in the south-east, Aston-by-Stone to the north-west, and Stafford in the west. In addition to this off-road route, there are advisory routes in Colwich and Little Haywood, which include the following roads:

- Bellamour Lane, from Main Road to B5013 Colton Road;
- Meadow Lane, from Main Road to Cannock Chase County Park; and
- Main Road, from Little Haywood to Great Haywood.

Great Haywood

5.4.88 The off-road cycle route along the canal towpath continues from Colwich and Little Haywood, and through Great Haywood, providing a traffic-free route to Stafford, Rugeley and Aston-by-Stone. There are also a number of advisory routes in Great Haywood, including:

- Main Road, from Mill Lane to Little Haywood;
- Mill Lane, from Great Haywood to Tixall. From here, Tixall Road provides access to Stafford town centre;
- Little Tixall Lane, from Main Road to Coley Lane; and
- Coley Lane, from Little Tixall Lane to Main Road in Little Haywood.

Hopton

5.4.89 Cycle facilities are limited within Hopton, with no main highways highlighted as advisory routes. Although the NCN route 5 lies approximately 1.8km west of Hopton, and routes via Marston Lane, Marston. This route can be followed towards Stone in the north or towards Stafford in a southerly direction.

Yarlet

5.4.90 There are no cycle facilities in Yarlet. However, the following routes are available nearby:

- a continuous footway is provided from Yarlet to Stafford, where users are advised to 'walk your bicycle'. This path also gives access to a network of advisory routes to the west of Yarlet, including Whitgreave Lane, Green Lane and March Lane; and
- the NCN route 5 passes through Marston, approximately 1.5km south-east of Yarlet, and can be accessed via Yarlet Lane.

Weston

5.4.91 There are few cycle facilities within Weston, with only one advisory route along old Road/ Green Road to bypass a section of the A518 Weston Road. However, the following routes are available nearby:

- A continuous off-road cycleway is in place along the towpath of the Trent and Mersey canal, which routes north-south to the west of Weston;
- An advisory route to Gayton via Vicarage Bank which can be accessed via a footpath (where cyclists must dismount); and
- An advisory route to Salt via Willowmore Bank, accessed off the A518 west of Weston.

Equestrian facilities

5.4.92 There are 10 bridleways and one Byway Open to All Traffic (BOAT) in the vicinity of the Proposed Scheme in the Colwich to Yarlet area and these are listed below.

5.4.93 In addition, following engagement between SCC and the North Staffordshire Bridleways Association, there are two roads in the vicinity of the Proposed Scheme which have been identified by the North Staffordshire Bridleways Association as being considered particularly important to equestrians. These are as follows:

- Yarlet Lane, between the settlements of Yarlet and Marston; and
- Marston Lane, from its junction with Yarlet Lane as far as Hollytree Farm.

Public rights of way

5.4.94 The baseline survey report (see BID-TR-001-000) provides a summary of the PRoW survey data within the Colwich to Yarlet area in close proximity to the Proposed Scheme. For ease of reference the PRoW data has been presented for each parish within the area.

5.4.95 The following PRoW are in close proximity to the Proposed Scheme:

- Colwich Footpath 6 – between Colwich Village and Bishton Lane;
- Colwich Bridleway 19 – between Moreton Grange Farm and Moreton Farm and part of a promoted route by SCC known as the Blithfield – Colton Millennium Walk;
- Colwich Bridleway 23 – between Bishton Lane and Moreton Lane, terminating at Bridleway 22;
- Colwich Footpath 26 – between Tolldish village and Little Tixall Lane, just north of Little Haywood village;
- Colwich Bridleway 35 – between Coley Lane and Moreton Lane;
- Colwich Footpath 36 – from Far Coley Farm to Moreton House, Moreton Lane;
- Colwich Footpath 54 – between Oldfield's Lane and Moreton Lane, Tolldish;
- Colwich Footpath 55 – between Oldfield's Lane and Tolldish Lane;
- Colwich Footpath 56 – between Great Haywood village and Oldfields Lane;
- Colwich Bridleway 58 – between Great Haywood village and Footpath 54 just north of Tithebarn Covert;
- Colwich Bridleway 63 – from the Colwich/Colton parish boundary, as far as Pasturefields;
- Tixall 0.1628 Bridleway – from Hanyards Lane to Trent Walk, as far as the Tixall/Hopton and Coton parish boundary;
- Tixall 0.1629 Bridleway – between Tixall and Brancote;
- Tixall 0.1630 (b) Footpath – routes along Hanyards Lane as far as Ingestre Hall;
- Ingestre 1 BOAT – between Ingestre and Great Haywood;

- Hopton and Coton Footpath 6 – between Hopton and Stafford and part of the "Two Saints Way" route, promoted by SCC;
- Hopton and Coton Footpath 9 – between Hopton Lane in Hopton Village to Footpath 14 just to the east of the B5066 Sandon Road;
- Hopton and Coton Bridleway 11 - between the B5066 Sandon Road and Newbuildings Farm;
- Hopton and Coton Bridleway 12 – between the B5066 Sandon Road and Kents Barn Farm;
- Hopton and Coton Bridleway 16 – between Marston Lane and the eastern side of Marston village;
- Hopton and Coton Footpath 24 – from the west of Pool Cottage to the fields located just south of Hopton Pools;
- Marston 2 Footpath – between Yarlet Lane, Marston and Ensonmoor Farm on Salters Lane;
- Marston 8 Bridleway – between Marston Lane and the Marston/Hopton and Coton parish boundary;
- Marston 9 Footpath – between Yarlet Lane and Marston Lane; and
- Marston 10 Footpath – between Brook Farm and Marston Lane.

Waterways/canals

5.4.96 There are three waterways situated within the Colwich to Yarlet area. These include the Trent and Mersey Canal and River Trent, both of which cross the alignment of the Proposed Scheme. The Staffordshire and Worcestershire Canal is also situated in the Colwich to Yarlet area, but does not cross the alignment of the Proposed Scheme.

5.4.97 Great Haywood Marina is located to the west of Great Haywood village, at the point where the Trent and Mersey Canal forks to form the Staffordshire and Worcestershire Canal. This marina has capacity for up to 200 narrow boats.

5.5 Stone and Swynnerton area

Study area

5.5.1 Roads potentially affected by the Proposed Scheme in the Stone and Swynnerton area include the M6, the A51 Stone Road, the A34 Stafford Road/The Fillybrooks, the A519 Newcastle Road, the A5182 Trentham Road, and the B5026 Eccleshall Road, and local roads serving the settlements of Swynnerton, Yarnfield, and Eccleshall.

5.5.2 The WCML runs broadly parallel to the Proposed Scheme alignment, both to north and south. In addition, the route of the Proposed Scheme crosses the alignment of the Norton Bridge to Stone Railway in the vicinity of Yarnfield. The Trent and Mersey Canal runs in a broadly north-west to south-east alignment within the area. The location of the key transport infrastructure can be found in Figure B3 and Figure B8 (see Annex B).

Local land uses

5.5.3 The Stone to Swynnerton area is predominantly rural, comprised largely of fields, small towns and settlements including Walton, Yarnfield, Meaford, Norton Bridge, Swynnerton and Tittensor. Stone is the largest town, with a population of 16,000[48] and a railway station providing links to north and south.

Surveys

5.5.4 Initial traffic surveys were undertaken in November and December 2015, with additional surveys undertaken in 2016 within the months of February, March, July and November and further surveys undertaken in March 2017. Non-motorised user surveys were undertaken in 2016 within June and November to establish the usage of roads and PRoW by pedestrians, cyclists and equestrians in the area of the route of the Proposed Scheme. The survey types and locations are shown in the baseline survey report (see BID-TR-001-000).

Traffic surveys

5.5.5 The traffic surveys comprised of ATCs on links, and MCCs and QLSs at junctions across the study area. Where possible, ATC data was gathered for a two week period. In total 90 surveys have been undertaken.

5.5.6 In addition to the newly commissioned surveys, existing transport survey data has been obtained from SCC and Highways England, including ATCs and MCCs.

Non-motorised user surveys

5.5.7 As appropriate to the role of the PRoW, these surveys covered weekday and weekend use. The surveys included:

- roads and associated footways intersected by the Proposed Scheme and those potentially affected by proposed construction works; and
- PRoW intersected or likely to be affected routes including footpaths, bridleways, cycleways, and canal paths.

Highway network

Strategic and primary 'A' road network

5.5.8 There are two strategic roads which pass through the study area. The M6 traverses the centre of the area along a north to south alignment and connects Stoke-on-Trent and Newcastle-under-Lyme with Stafford in this locality. The M6 is a six lane motorway with hard shoulders and a speed limit of 70mph. Junction 15 is the primary M6 junction to access Stoke on Trent and Newcastle-under-Lyme. The route of the Proposed Scheme crosses the alignment of the M6 in the vicinity of Stone. The M6 will be used as a main route for construction traffic.

5.5.9 A small section of the A500(T) Queensway runs through the northernmost part of the area, where it connects with the M6 and A519 Newcastle at junction 15. In this area, the A500(T) Queensway is a dual carriageway with a speed limit of 50mph. The A500(T) Queensway is expected to be used as a route for construction traffic.

5.5.10 The A34 Stone Road passes through the area along a north to south alignment, connecting Trentham in the north to Aston-by-Stone in the south. The A34 Stone Road is a dual carriageway throughout the Stone and Swynnerton area with a 50mph speed restriction for the majority of its length. The section of the A34 Stone Road through Stone (The Fillybrooks/Stafford Road) has a reduced speed limit of 30mph. The A34 is expected to be used as a primary route for construction traffic.

5.5.11 The A51 Lichfield Road has a broadly north-west to south-east alignment and links Rugeley to Stone in this area. The A51 Lichfield Road routes through Stone and then a number of smaller villages and hamlets including Burston, Meaford, The Rowe and Stableford. The route of the Proposed Scheme crosses the alignment of the A51 Stone Road at its junction with Bottom Lane, just north of Swynnerton village. In this vicinity, the A51 Stone Road is a single carriageway with a speed limit of 60mph. The A51 Lichfield Road/Stone Road from Stone to Woore is expected to be used as a route for construction traffic.

5.5.12 The A519 Newcastle Road provides a north-east to south-west connection through the Stone and Swynnerton area, and passes through the settlements of Eccleshall, Slindon, Mild Meece, Cotes Heath and Beech. The route of the Proposed Scheme crosses the alignment of the A519 Newcastle Road just north of the A51 Stone Road/A519 Newcastle Road junction. In this area the A519 Newcastle Road is a single carriageway road with a speed limit of 60mph. The A519 Newcastle Road is expected to be used as a route for construction traffic, between the A51 Stone Road and A500 Queensway.

5.5.13 Figure B3 (see Annex B) illustrates the strategic, primary and road network in the Stone and Swynnerton area.

Local road network

5.5.14 The B5026 Eccleshall Road runs in a broadly east to west alignment through the Stone and Swynnerton area and connects the settlements of Eccleshall, Norton Bridge and Walton to Stone in the east. The B5026 is a single carriageway road generally with a 60mph speed limit and speed reductions as it intersects these settlements. The route of the Proposed Scheme crosses the alignment of the B5026 just east of the M6. The B5026 Eccleshall Road is expected to be used as a route to access one construction compound.

5.5.15 There are a number of lower order roads which are likely to be affected by the Proposed Scheme. These include:

- Pirehill Lane, between Green Lane and Coombe Park Road;
- Yarnfield Lane, between A34 The Fillybrooks and the M6 overbridge;
- Unnamed road, between Hall Lane and the M6 carriageway;
- Tittensor Road , between A51 Stone Road and Swynnerton village;
- Stab Lane between A51 Stone Road/Bottom Lane junction and Swynnerton village;
- Bottom Lane, at its junction with the A51 Stone Road;

- Dog Lane, between A51 The Rowe and Drayton Road; and
- Bent Lane, between A51 The Rowe and A53 Newcastle Road.

Baseline traffic flows

5.5.16 The baseline traffic flows for strategic and primary 'A' roads are summarised for the Stone and Swynnerton area in Table 55 below. Table 56 provides baseline traffic flows for local roads in the area.

Table 55: Stone to Swynnerton strategic and primary 'A' road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
M6 (between Yarnfield Lane and M6 junction 15 slip road)	NB	4069	763	3938	559	59961	10190
	SB	3695	655	3859	648	56568	10044
M6 (between M6 junction 15 slip road and M6 junction 16 slip road)	NB	3244	692	3343	534	49323	9446
	SB	3509	654	3645	645	53569	10020
M6 (mainline flow on M6 within junction 15)	SB	2202	417	2722	390	45831	9416
	NB	2214	541	2644	381	45255	10706
A34 Stafford Road (between Stone Bypass and Eccleshall Road)	NB	1066	89	1390	37	13483	852
	SB	1659	93	1076	33	15009	852
A34 Stone Road (between Queensway and Longton Road)	SB	1015	82	1777	50	17642	834
	NB	1149	81	1055	45	13926	795
A34 Stone Road (between Winghouse Lane and Longton Road)	SB	992	59	1206	29	12136	620
	NB	1041	62	1039	28	11481	631
A34 Stone Road (between Winghouse Lane and Chase Lane)	SB	944	61	1063	21	11579	569
	NB	937	59	1030	30	11352	618
A34 The Fillybrooks (between Eccleshall Road and Yarnfield Lane)	WB	915	67	811	24	8497	574
	EB	884	64	1225	36	10383	636
A34 The Fillybrooks (between Newcastle Road and Meaford Road)	NB	1219	109	1263	45	15683	972
	SB	1428	95	1539	34	18749	815
A34 The Fillybrooks (between Trent Road and Newcastle Road)	NB	877	69	903	31	9640	686

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	1348	78	1205	23	13827	693
A500 Queensway (between Newcastle Road and Stone Road)	EB	2230	237	1581	144	22881	3148
	WB	1396	198	1528	116	17560	2592
A500 Queensway (between Newcastle Road and M6)	WB	2132	257	2021	199	23236	2964
	EB	811	98	793	78	8975	1143
A51 Bury Bank (between Stone Road and east of Winghouse Lane)	WB	168	18	188	4	1656	135
	EB	291	11	170	6	2148	105
A51 Bury Bank (between Winghouse Lane and east of Winghouse Lane)	WB	181	9	209	5	1887	70
	EB	235	6	179	4	2003	61
A51 Lichfield Road (between Uttoxeter Road and Church Lane)	SB	944	61	1063	21	11579	569
	NB	937	59	1030	30	11352	618
A51 Stone Road (between Coombsdale and Road from A51 Stone Road to Clayalders Bank)	WB	160	7	207	4	1609	64
	EB	194	5	161	3	1610	49
A51 Stone Road (between the Proposed Scheme and Newcastle Road)	WB	197	11	218	4	1750	86
	EB	276	11	201	9	2014	115
A51 Stone Road (between the Proposed Scheme and Tittensor Road)	WB	216	11	231	4	1901	87
	EB	274	13	207	9	2040	127
A51 Stone Road (between Newcastle Road and Common Lane)	WB	184	6	215	4	1678	64
	EB	195	5	140	3	1500	38
A51 Stone Road (between Road from A51 Stone Road to Clayalders Bank and Nantwich Road)	WB	169	8	323	5	1874	70

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	EB	161	5	151	3	1492	51
A51 Stone Road (between Tittensor Road and the Proposed Scheme)	WB	216	11	231	4	1901	87
	EB	274	13	207	9	2040	127
A51 Stone Road (between Winghouse Lane and Tittensor Road)	WB	374	9	350	5	3048	74
	EB	358	7	380	5	3118	68
A51 The Rowe (between Bent Lane and Stableford Bank)	WB	156	7	224	3	1780	55
	EB	179	3	147	5	1639	50
A51 The Rowe (between Common Lane and Dog Lane)	NB	233	15	226	6	1801	117
	SB	236	10	181	6	1641	90
A51 through Stableford (between Stableford Bank and Coombsdale)	WB	163	5	211	4	1638	53
	EB	197	5	163	3	1632	48
A519 Newcastle Road (between Drayton Road and Hanchurch Lane)	NB	250	6	286	7	3064	122
	SB	255	12	319	7	3266	142
A519 Newcastle Road (between Hanchurch Lane and Whitmore Road)	NB	309	6	354	9	3765	99
	SB	308	4	346	6	3738	84
A519 Newcastle Road (between Long Lane and Drayton Road)	NB	259	22	279	8	2948	232
	SB	255	25	268	9	2863	258
A519 Newcastle Road (between Long Lane and the Proposed Scheme)	NB	212	18	192	7	2377	204
	SB	179	22	219	9	2340	247
A519 Newcastle Road (between Station Road and Stone Road)	SB	216	23	255	8	2628	240

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	NB	244	20	214	8	2557	214
A519 Newcastle Road (between Stone Road and the Proposed Scheme)	NB	212	18	192	7	2377	204
	SB	179	22	219	9	2340	247
A519 Newcastle Road (between Whitmore Road and Queensway)	NB	485	15	458	18	6543	284
	SB	455	14	605	12	7132	326

Table 56: Stone to Swynnerton local road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A5020 Stafford Road (between The Fillybrooks and Radford Street)	NB	691	47	627	17	8329	401
	SB	729	45	736	21	9260	414
A5182 Trentham Road (between Whitmore Road and Newcastle Road)	WB	300	36	307	11	3886	362
	EB	259	24	237	12	3175	283
B5026 Eccleshall Road (between Meece Road and Proposed Scheme)	NB	198	6	230	2	2170	48
	SB	198	5	242	2	2240	36
B5026 Eccleshall Road (between Pirehill Lane and Proposed Scheme)	SWB	192	21	197	6	1908	166
	NEB	237	12	240	7	2342	116
B5026 Eccleshall Road (between The Fillybrooks and Pirehill Lane)	SWB	401	14	458	7	4607	147
	NEB	662	14	518	10	6327	175
B5027 Newcastle Road (between Trent Road and The Fillybrooks)	NB	230	13	260	8	3503	148
	SB	46	1	60	1	762	15
Winghouse Lane (between Chase Lane and Bury Bank)	NB	144	2	152	6	1137	27
	SB	155	11	128	1	1093	39
Winghouse Lane (between Chase Lane and Stone Road)	NB	144	2	152	6	1137	27
	SB	155	11	128	1	1093	39
Long Lane (between Stone Road and Newcastle Road)	NB	47	3	88	1	572	26
	SB	77	2	49	0	533	14
Stab Lane (between Tittensor Road and the Proposed Scheme)	SB	61	4	97	3	709	37

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	NB	72	3	45	1	525	19
Tittensor Road (between Stab Lane and the Proposed Scheme)	SB	127	2	187	6	1192	31
	NB	189	7	117	1	1162	29
Chase Lane (between Winghouse Lane and Stone Road)	EB	59	2	84	1	543	14
	WB	97	3	54	0	573	15
Trent Road (between The Fillybrooks and Newcastle Road)	EB	398	8	364	5	3406	86
	WB	148	2	109	1	1147	18
Yarnfield Lane (between The Fillybrooks and the Proposed Scheme)	WB	200	7	205	3	1982	57
	EB	232	4	155	3	1895	39
Yarnfield Lane (between the Proposed Scheme and Yarnfield Lane (north-bound)	WB	210	7	214	3	2091	59
	EB	228	6	153	3	1873	55
Unnamed road from A51 Stone Road to Clayalders Bank (between Stone Road and Haddon Lane)	SB	19	1	26	0	258	8
	NB	37	0	20	1	264	5
Bent Lane (between The Rowe and the Proposed Scheme)	NB	99	1	25	1	363	11
	SB	32	1	53	0	250	6
Bent Lane (south of the Proposed Scheme)	NB	99	1	25	1	363	11
	SB	32	1	53	0	250	6
Dog Lane (between The Rowe and the Proposed Scheme)	EB	17	1	11	0	235	7
	WB	6	0	11	0	143	2
Common Lane (between Biddles Lane and the Proposed Scheme)	NB	3	0	3	1	28	2

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	3	0	3	0	28	2
Hanchurch Lane (between Newcastle Road and Peacock Lane)	SB	25	1	21	0	221	4
	NB	21	0	23	0	223	2
Pirehill Lane (between Coombe Park Road and the Proposed Scheme)	SB	3	0	5	0	45	1
	NB	7	0	3	0	65	1
Pirehill Lane (between Eccleshall Road and Coombe Park Road)	SB	144	1	183	2	1628	39
	NB	270	12	175	4	2043	82
Pirehill Lane (between the Proposed Scheme and Green Lane)	SB	3	0	5	0	45	1
	NB	7	0	3	0	65	1

Junction operation

5.5.17 The operation of the key junctions that could be affected by the Proposed Scheme works, or will potentially be used as the main access routes from the SRN through the study area to the construction sites, have been assessed and the results are summarised below.

5.5.18 Junctions 9 software has been used to calculate the existing capacity of all priority controlled junctions within the study area. LINSIG software has been used to calculate the existing capacity of all signal controlled junctions.

5.5.19 Junctions 9 calculates the RFC and queue for each approach to a junction. The RFC indicates the likely performance of a junction under a given set of traffic flows and the queue represents a typical queue found at the end of each time segment within the modelled time period. LINSIG calculates the DoS and MMQ for each approach under a given set of traffic flows, with the MMQ the average maximum queue modelled within each traffic signal cycle.

5.5.20 At over 85% to 90% DoS or 0.85 to 0.9 RFC, queues are likely to increasingly occur. Consequently permanent highway infrastructure is generally designed to stay below this level. At over 100% DoS or 1.0 RFC, if sustained over time, the level of traffic cannot be accommodated. This is referred to as 'theoretical maximum capacity'. In congested urban areas, junctions often operate at or above the theoretical capacity for short periods.

5.5.21 Where two DoS values are presented in the results tables, this provides the value for both the approach lane and its respective flare. All queue lengths and traffic flow inputs to both the LINSIG and Junctions 9 models are presented in PCUs.

5.5.22 The results for the Stone and Swynnerton area are presented in the order of roundabout junctions, priority controlled (give-way) and signalised junctions.

A51 Stone Bypass /A34 Stafford Road/Brooms Road

5.5.23 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 57.

Table 57: 2016 baseline performance at A51 Stone Bypass/A34 Stafford Road/Brooms Road junction

Approach	2016 AM (08:00 - 09:00) baseline results		
	Flow, PCU/hr	RFC	Queue, PCU
A34 Stafford Road (north)	1780	0.61	2
A51 Stone Bypass	949	0.89	8
A34 Stafford Road (south)	805	0.42	1
Brooms Road	167	0.11	0
	2016 PM (17:00 - 18:00) baseline results		
A34 Stafford Road (north)	1289	0.49	1
A51 Stone Bypass	526	0.37	1
A34 Stafford Road (south)	1264	0.54	1
Brooms Road	566	0.5	1

5.5.24 The model shows that this junction is approaching its capacity on the A51 Stone Bypass arm in the AM peak period, with an RFC of 0.89 and a corresponding queue length of eight PCUs. The remaining arms are shown to operate within capacity.

A34 The Fillybrooks/A520 Stafford Road/A34 Stafford Road/B5026 Eccleshall Road

5.5.25 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 58.

Table 58: 2016 baseline performance at A34 The Fillybrooks/A520 Stafford Road/A34 Stafford Road/B5026 Eccleshall Road

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A34 The Fillybrooks (north)	1234	0.99	24
A520 Stafford Road	826	0.87	6
A34 Stafford Road (south)	1163	0.5	1
B5026 Eccleshall Road	762	0.61	2
	2016 PM (17:00 - 18:00) baseline results		
A34 The Fillybrooks (north)	1043	0.91	9
A520 Stafford Road	714	0.62	2
A34 Stafford Road (south)	1871	0.82	5
B5026 Eccleshall Road	639	0.82	4

5.5.26 The model shows that this junction operates close to, or just over its capacity across several arms in both peak periods. The A34 The Fillybrooks (north) arm shows a RFC of 0.99 and 0.91 in the AM and PM peak periods, and corresponding queue of 24 PCUs and nine PCUs respectively.

A34 The Fillybrooks/B5027 Newcastle Road

5.5.27 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 59.

Table 59: 2016 baseline performance at A34 The Fillybrooks/B5027 Newcastle Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 – 09:00) baseline results		
A34 The Fillybrooks (north)	1344	0.43	1
Newcastle Road	309	0.27	0
A34 The Fillybrooks (south)	966	0.42	1
	2016 PM (17:00 - 18:00) baseline results		
A34 The Fillybrooks (north)	1458	0.47	1
Newcastle Road	338	0.3	0
A34 The Fillybrooks (south)	1024	0.45	1

5.5.28 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Bury Bank/A51 Stone Road/A34 The Fillybrooks/Jervis Lane

5.5.29 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The junction also provides access to a public house and children's play area within its central reservation area. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 60.

Table 60: 2016 baseline performance at A51 Bury Bank/A34 Stone Road/A34 The Fillybrooks/Jervis Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 M (08:00 - 09:00) baseline results		
A34 Stone Road (north)	1124	0.46	1
A34 The Fillybrooks (south)	1207	0.38	1
Jervis Lane	-	exit only	exit only
A51 Bury Bank	259	0.2	0
	2016 PM (17:00 - 18:00) baseline results		
A34 Stone Road (north)	1148	0.45	1
A34 The Fillybrooks (south)	1415	0.44	1
Jervis Lane	-	exit only	exit only
A51 Bury Bank	184	0.17	0

5.5.30 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A34 Stone Road/A5035 Longton Road

5.5.31 This junction is a four-arm roundabout junction with a signal controlled pedestrian crossing facility on its northern arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 61.

Table 61: 2016 baseline performance at A34 Stone Road/A5035 Longton Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A34 Stone Road (north)	1253	0.46	1
A5035 Longton Road	673	0.39	1
A34 Stone Road (south)	1116	0.61	2
Threntham Centre access	58	0.05	0
	2016 PM (17:00 - 18:00) baseline results		
A34 Stone Road (north)	1668	0.67	2
A5035 Longton Road	813	0.56	1
A34 Stone Road (south)	1112	0.66	2
Threntham Centre access	193	0.17	0

5.5.32 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Stone Road/A519 Newcastle Road

5.5.33 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 62.

Table 62: 2016 baseline performance at A51 Stone Road/A519 Newcastle Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A519 Newcastle Road (north)	208	0.18	0
A51 Stone Road (east)	267	0.2	0
A519 Newcastle Road (south)	272	0.17	0
A51 Stone Road (west)	245	0.19	0
	2016 PM (17:00 - 18:00) baseline results		
A519 Newcastle Road (north)	234	0.19	0
A51 Stone Road (east)	290	0.22	0
A519 Newcastle Road (south)	232	0.15	0
A51 Stone Road (west)	195	0.15	0

5.5.34 The model shows that this junction operates within capacity in the AM and PM peak hours with no significant queuing modelled on any of the approaches to the junction.

A500 Queensway/A519 Newcastle Road/Clayton Road (Hanchurch Interchange)

5.5.35 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 63.

Table 63: 2016 baseline performance at A500 Queensway/A519 Newcastle Road/Clayton Road (Hanchurch Interchange) junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Clayton Road	530	1.23	54
A500 Queensway (east)	1777	0.92	12
A519 Newcastle Road	537	0.77	3
M6 junction 16 to A500 Hanchurch roundabout (west)	2586	0.97	22
	2016 PM (17:00 - 18:00) baseline results		
Clayton Road	623	0.92	9
A500 Queensway (east)	1802	1.0	33
A519 Newcastle Road	566	0.81	4
M6 junction 16 to A500 Hanchurch roundabout (west)	2411	0.78	4

5.5.36 The model shows that this junction operates over its capacity in both peak periods. The Clayton Road arm shows a RFC of 1.23 and 0.92 in the AM and PM peak periods, and corresponding queues of 54 PCUs and nine PCUs respectively, the A500 Queensway (east) arm shows a RFC of 0.92 and 1.0 in the AM and PM peak periods, and corresponding queue of 12 PCUs and 33 PCUs respectively, the M6 junction 16 to A500 Hanchurch Roundabout (west) arm shows a RFC of 0.97 in the AM peak period and corresponding queue of 22 PCUs.

A34 The Fillybrooks/Millennium Way

5.5.37 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 64.

Table 64: 2016 baseline performance at A34 The Fillybrooks/Millennium Way junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A34 The Fillybrooks (north)	1309	0.46	1
Millennium Way	191	0.33	1
A34 The Fillybrooks (south)	1217	0.39	1
	2016 PM (17:00 - 18:00) baseline results		
A34 The Fillybrooks (north)	1372	0.48	1
Millennium Way	288	0.54	1
A34 The Fillybrooks (south)	1316	0.43	1

5.5.38 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

B5026 Eccleshall Road/Pirehill Lane/Lamb Lane

5.5.39 This junction is a priority controlled (give way) crossroads junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 65.

Table 65: 2016 baseline performance at B5026 Eccleshall Road/Pirehill Lane/Lamb Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Pirehill Lane (ahead + left + right)	276	0.75	3
B5026 Eccleshall Road (north-east) (ahead + left + right)	5	0.01	0
B5026 Eccleshall Road (north-east) (left)	130	-	-
B5026 Eccleshall Road (north-east) (ahead)	289	-	-
Lamb Lane (ahead + left + right)	7	0.02	0
B5026 Eccleshall Road (south-west) (ahead + left + right)	88	0.11	0
B5026 Eccleshall Road (south-west) (left)	0	-	-
B5026 Eccleshall Road (south-west) (ahead)	448	-	-
	2016 PM (17:00 - 18:00) baseline results		
Pirehill Lane (ahead + left + right)	151	0.42	1
B5026 Eccleshall Road (north-east) (ahead + left + right)	5	0.01	0
B5026 Eccleshall Road (north-east) (left)	160	-	-
B5026 Eccleshall Road (north-east) (ahead)	416	-	-
Lamb Lane (ahead + left + right)	0	0	0
B5026 Eccleshall Road (south-west) (ahead + left + right)	47	0.07	0
B5026 Eccleshall Road (south-west) (left)	0	-	-
B5026 Eccleshall Road (south-west) (ahead)	366	-	-

5.5.40 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A34 The Fillybrooks/Yarnfield Lane

5.5.41 This junction is a priority controlled (give way) T-junction with a central reservation and associated 'ghost island' right turn facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 66.

Table 66: 2016 baseline performance at A34The Fillybrooks/Yarnfield Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Yarnfield Lane (left)	133	0.25	0
Yarnfield Lane (right)	74	0.24	0
A34 The Fillybrooks (north) (ahead)	1282	-	-
A34 The Fillybrooks (north) (right)	208	0.33	1
A34 The Fillybrooks (south) (left)	98	-	-
A34 The Fillybrooks (south) (ahead)	900	-	-
	2016 PM (17:00 - 18:00) baseline results		
Yarnfield Lane (left)	92	0.17	0
Yarnfield Lane (right)	52	0.16	0
A34 The Fillybrooks (north) (ahead)	1072	-	-
A34 The Fillybrooks (north) (right)	182	0.29	0
A34 The Fillybrooks (south) (left)	123	-	-
A34 The Fillybrooks (south) (ahead)	892	-	-

5.5.42 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A34 The Fillybrooks/Meaford Road

5.5.43 This junction is a priority controlled (give way) T-junction with a central reservation and associated 'ghost island' right turn facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 67.

Table 67: 2016 baseline performance at A34/Meaford Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Meaford (left + right)	7	0.01	0
A34 The Fillybrooks (south) (ahead + right)	0	0	0
A34 The Fillybrooks (south) (ahead)	1177	-	-
A34 The Fillybrooks (north) (left)	8	-	-
A34 The Fillybrooks (north) (ahead)	1405	-	-
	2016 PM (17:00 - 18:00) baseline results		
Meaford Road (left + right)	11	0.02	0
A34 The Fillybrooks (south) (ahead + right)	0	0	0
A34 The Fillybrooks (south) (ahead)	1360	-	-
A34 The Fillybrooks (north) (left)	0	-	-
A34 The Fillybrooks (north) (ahead)	1358	-	-

5.5.44 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A34 Stone Road/Tittensor Road

5.5.45 This junction is a priority controlled (give way) T-junction with a central reservation and associated 'ghost island' right turn facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 68.

Table 68: 2016 baseline performance at A34 Stone Road/Tittensor Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Tittensor Road (left)	112	0.23	0
Tittensor Road (right)	64	0.19	0
A34 Stone Road (south) (ahead)	785	-	-
A34 Stone Road (south) (right)	79	0.14	0
A34 Stone Road (north) (left)	115	-	-
A34 Stone Road (north) (ahead)	878	-	-
	2016 PM (17:00 - 18:00) baseline results		
Tittensor Road (left)	74	0.16	0
Tittensor Road (right)	31	0.12	0
A34 Stone Road (south) (ahead)	942	-	-
A34 Stone Road (south) (right)	122	0.25	0
A34 Stone Road (north) (left)	197	-	-
A34 Stone Road (north) (ahead)	1156	-	-

5.5.46 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 The Rowe/Dog Lane/Bent Lane

5.5.47 This junction is a priority controlled (give way) T-junction with two 'minor' arms i.e. Bent Lane and Dog Lane giving way to the A51 The Rowe. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 69.

5.5.48 In order to replicate existing conditions, it is necessary to model the junction as a linked priority junction in the Junctions 9 model. The junction has been modelled using the lane simulation mode and on this basis only queue length results values are available.

Table 69: 2016 baseline performance at A51 The Rowe/Dog Lane/Bent Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Dog Lane	9	-	0
A51 The Rowe (west)	254	-	0
A51 The Rowe (south)	213	-	0
Bent Lane	27	-	0
	2016 PM (17:00 - 18:00) baseline results		
Dog Lane	10	-	0
A51 The Rowe (west)	258	-	0
A51 The Rowe (south)	163	-	0
Bent Lane	61	-	0

5.5.49 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Stone Road/Tittensor Road

5.5.50 This junction is a priority controlled (give way) T-junction with no formal pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 70.

Table 70: 2016 baseline performance at A51 Stone Road/Tittensor Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Tittensor Road (left + right)	120	0.31	0
A51 Stone Road (west) (ahead + right)	3	0	0
A51 Stone Road (west) (ahead)	267	-	-
A51 Stone Road (east) (left)	154	-	-
A51 Stone Road (east) (ahead)	259	-	-
	2016 PM (17:00 - 18:00) baseline results		
Tittensor Road (left + right)	190	0.47	1
A51 Stone Road (west) (ahead + right)	1	0	0
A51 Stone Road (west) (ahead)	210	-	-
A51 Stone Road (east) (left)	128	-	-
A51 Stone Road (east) (ahead)	265	-	-

5.5.51 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A34 Stone Road/Winghouse Lane

5.5.52 This junction is a priority controlled (give way) T-junction with a central reservation and associated 'ghost island' right turn facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 71.

Table 71: 2016 baseline performance at A34 Stone Road/Winghouse Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Winghouse Lane (left + right)	209	0.43	1
A34 Stone Road (south) (ahead)	731	-	-
A34 Stone Road (south) (right)	157	0.28	0
A34 Stone Road (north) (left)	45	-	-
A34 Stone Road (north) (ahead)	802	-	-
	2016 PM (17:00 - 18:00) baseline results		
Winghouse Lane (left + right)	172	0.36	1
A34 Stone Road (south) (ahead)	962	-	-
A34 Stone Road (south) (right)	155	0.29	0
A34 Stone Road (north) (left)	51	-	-
A34 Stone Road (north) (ahead)	915	-	-

5.5.53 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A5182 Whitmore Road/A519 Newcastle Road

5.5.54 This junction is a four-arm signal control junction with no controlled pedestrian crossing facilities. The junction includes a large hatched 'keep clear' area to facilitate access/egress to an adjacent industrial unit. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 72.

Table 72: 2016 baseline performance at A5182 Whitmore Road/A519 Newcastle Road junction

Approach	Flow, PCU/hr	DoS	MMQ, PCU
	2016 AM (08:00 - 09:00) baseline results		
A519 Newcastle Road (north)	554	101%	22
B5038 Whitmore Road (east)	225	86%	8
A519 Newcastle Road (south)	337	124%	44
A5182 Whitmore Road (west)	281	58%	7
HGV depot access	0	0%	0
	2016 PM (17:00 - 18:00) baseline results		
A519 Newcastle Road (north)	732	110%	50
B5038 Whitmore Road (east)	165	90%	7
A519 Newcastle Road (south)	372	112%	32
A5182 Whitmore Road (west)	310	84%	10
HGV depot access	0	0%	0

5.5.55 The model shows that this junction is operating over capacity with: the A519 Newcastle Road (north) arm showing a DoS of 101% and 110% in the AM and PM peak periods and corresponding MMQ of 22 and 50 PCUs respectively; the A519 Newcastle Road (south) arm showing a DoS of 124% and 112% in the AM and PM peak periods and corresponding MMQ of 44 and 32 PCUs respectively; and the B5038 Whitmore Road (east) arm showing a DoS of 86% and 90% in the AM and PM peak periods and corresponding MMQ of eight and seven PCUs respectively.

A34 Stone Road/B5038 Whitmore Road

5.5.56 This junction is a four-arm signal control junction with no controlled pedestrian crossing facilities. The junction includes a large hatched 'keep clear' area within the junction. It also provides an access to a small residential development, which is not controlled by the traffic signals. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 73.

Table 73: 2016 baseline performance at A34 Stone Road/B5038 Whitmore Road junction

Approach	Flow, PCU/hr	DoS	MMQ, PCU
	2016 AM (08:00 - 09:00) baseline results		
A34 Stone Road (north) (left turn ahead) (at Allerton Road junction)	301	34%	5
A34 Stone Road (north) (ahead) (at Allerton Road junction)	656	63%	13
A34 Stone Road (north) (ahead) (at Whitmore Road junction)	249	26%	2
A34 Stone Road (north) (right turn ahead) (at Whitmore Road junction)	747	70%	4
B5038 Whitmore Road	453	59%	9
A34 Stone Road (south) (left turn ahead)	691	76%	13
A34 Stone Road (south) (ahead)	550	80%	13
Allerton Road	191	29%	4
	2016 PM (17:00 - 18:00) baseline results		
A34 Stone Road (north) (left turn ahead) (at Allerton Road junction)	671	85%	18
A34 Stone Road (north) (ahead) (at Allerton Road junction)	780	87%	21
A34 Stone Road (north) (ahead) (at Whitmore Road junction)	548	55%	2
A34 Stone Road (north) (right turn ahead) (at Whitmore Road junction)	794	72%	2
B5038 Whitmore Road	614	86%	16
A34 Stone Road (south) (left turn ahead)	857	79%	10
A34 Stone Road (south) (ahead)	433	54%	9
Allerton Road	90	14%	2

5.5.57 The model shows that this junction is approaching capacity in the PM peak hours, with the A34 Stone Road (north) arm showing a DoS of 87% and corresponding MMQ of 43 PCUs and the B5038 Whitmore Road arm with the A34 Stone Road (north) arm showing a DoS of 86% and a corresponding MMQ of 16 PCUs.

A34 Stone Road/A500 Queensway

5.5.58 This junction is a grade separated four-arm signal controlled roundabout junction with controlled pedestrian/cycle crossing facilities contained within the junction. The junction connects to the A500 Queensway which passes above it via 'on' and 'off' slips in both directions. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 74.

Table 74: 2016 baseline performance at A34 Stone Road/A500 Queensway junction

Approach	Flow, PCU/hr	DoS	MMQ, PCU
	2016 AM (08:00 - 09:00) baseline results		
A500 Queensway (west) (off-slip left turn ahead)	717	94%	18
A500 Queensway (west) (off-slip ahead)	352	56%	8
A34 Stone Road (north) (left turn ahead)	758	95%	18
A34 Stone Road (north) (ahead)	348	62%	5
A500 Queensway (east) (off-slip left turn)	261	58%	6
A500 Queensway (east) (off-slip ahead)	68	14%	1
A34 Stone Road (south) (left turn ahead)	624	51%	9
A34 Stone Road (south) (ahead)	1195	96%	37
	2016 PM (17:00 - 18:00) baseline results		
A500 Queensway (west) (off-slip left turn ahead)	873	97%	21
A500 Queensway (west) (off-slip ahead)	243	44%	5
A34 Stone Road (north) (left turn ahead)	947	78%	11
A34 Stone Road (north) (ahead)	208	22%	2
A500 Queensway (east) (off-slip left turn)	173	68%	5
A500 Queensway (east) (off-slip ahead)	134	49%	4
A34 Stone Road (south) (left turn ahead)	290	33%	5
A34 Stone Road (south) (ahead)	938	93%	25

5.5.59 The model shows that this junction is approaching its capacity on the A500 Queensway (west) arm in the AM and PM peak periods, with a DoS of 94% and 97% and corresponding MMQ of 18 and 21 PCUs respectively.

M6 junction 15

5.5.60 The existing operation of junction 15 of the M6 was assessed, using the M6 junctions 13 - 15 SATURN model during the AM and PM hours as shown in Table 75 for a 2012 baseline year.

Table 75: 2012 baseline results for the M6 junction 15

Approach	Flow, PCU/hr	V/C	Queue, PCU
	2012 AM (08:00 - 09:00) baseline results		
South-bound off-slip	822	66%	4
South-bound on-slip	1224	50%	0
North-bound off-slip	1496	66%	0
North-bound on-slip	860	41%	0
	2012 PM (17:00 - 18:00) baseline results		
South-bound off-slip	703	66%	4
South-bound on-slip	1179	48%	0
North-bound off-slip	1193	52%	0
North-bound on-slip	618	29%	0

5.5.61 The model results show that the junction operates within capacity during the 2012 baseline.

Accidents and safety

5.5.62 Road traffic collisions are referred to as accidents in this report. This provides consistency of reporting with the HS2 Phase One ES. Accident records have been obtained from the information provided by SCC. This report considers the three years from 30 April 2012 to 30 April 2015.

5.5.63 Within the Stone and Swynnerton area, a total of 325 accidents occurred over the three year period, of which 303 (93.2%) were recorded as slight, 16 (4.9%) as serious and 6 (1.8%) as fatal.

5.5.64 Regarding the roads where accidents occurred, 30.2% of the accidents within the Stone and Swynnerton area were located on the M6, followed by the A34 Stone Road (12.9%), the A51 Lichfield Road/Stone Road (7.4%) and the A520 Stratford Road (6.2%).

5.5.65 There were 35 accidents involving non-motorised user modes (i.e., pedestrians, cyclists, equestrians or mobility scooters). Most of these pedestrian and cycling related accidents occurred on the A34 Stone Road (14.3%), A519 Newcastle Road (14.3%) and B5027 Eccleshall Road (14.3%).

5.5.66 One accident cluster was identified in the Stone and Swynnerton area, located on the A500 Queensway junction with A519 Newcastle Road (14 accidents over the last three years). In terms of severity, all of these accidents were reported as slight and none of them involved pedestrians or cyclists.

5.5.67 The baseline survey report (see BID-TR-001-000) illustrates the location of accidents recorded in the Stone and Swynnerton area over the three years from April 2012 to April 2015. Severity is shown depending on icon colour (green: slight, yellow: serious; red: fatal). Pedestrian icons show pedestrian and cycling related accidents.

Parking and loading

5.5.68 There is no designated parking or loading identified in the area that is expected to be impacted by the Proposed Scheme. Consequently, this topic is not considered further in this assessment.

Public transport

5.5.69 Public transport provision within the Stone to Swynnerton area is focused on the three hubs of Stafford, Stoke-on-Trent and Newcastle-under-Lyme. However, these centres are not located in this area. Several bus routes do cross the area, with some accessing Stone and smaller settlements within the area.

5.5.70 The following sections describe the available public transport provision in the Stone to Swynnerton area at the time of assessment.

Rail network

5.5.71 The WCML has two major branch lines in the Stone to Swynnerton area, the main WCML follows a more westerly alignment from Norton Bridge, towards Crewe, while the Macclesfield to Colwich Line runs parallel through Stone and then heads north towards Stoke-on-Trent and Manchester. A branch line (the Norton Bridge to Stone railway) spurs off at Norton Bridge junction and connects to the Macclesfield to Colwich Line at Stone station.

5.5.72 The main railway station in the area is Stone Station, which provides direct services to local, regional and national destinations, including Stoke-on-Trent, Stafford, Crewe, and London. London Midland operates these services at a frequency of generally one train per hour in each direction.

5.5.73 Virgin Trains operates intercity services along both routes, although all services pass through the Stone and Swynnerton area and do not stop.

5.5.74 The route of the Proposed Scheme will cross the alignment of the WCML between Norton Bridge and Stone.

5.5.75 Figure B8 (see Annex B) illustrates the rail network in the Stone and Swynnerton area.

Local bus services

5.5.76 Bus service provision in the Stone to Swynnerton area focuses on the larger settlements of Stafford, to the south of the area, as well as Newcastle-under-Lyme and Stoke-on-Trent, situated further to the north. The town of Stone is the largest settlement in the area and a number of bus services provide access from Stone to other settlements.

5.5.77 Buses travelling through the Stone to Swynnerton area use the following corridors:

- A51 Lichfield Road corridor, via Stone and Sandon, which is served by one bus service, the 842A which provides connections to Stafford, Weston and Longton;
- A34 Stone Road corridor, via Walton and Stone, which is served by five bus services, numbers S3, S5, 12, 14/14A/14B and 101. These provide connections

to Hanley, Stoke, Longton, Stafford, Trentham, Meaford, Tittensor and Barlaston;

- A519 Newcastle Road corridor, via Eccleshall and Swynnerton, which is served by three bus services, numbers 13A, 14/14A and 15. These provide connections to Stafford, Newport, Stone, Woodseaves, and Yarnfield;
- B5026 Eccleshall Road corridor, via Eccleshall which is served by one bus service number 13that provides connections to Stafford, Newport, Stone, Norton Bridge and Great Bridgford; and
- Yarnfield Lane/Swynnerton Road which is served by three bus services numbers 12, 13A and 14/14B that provide connections to Stafford, Stoke on Trent, Stone, Swynnerton, Eccleshall and Norton Bridge.

5.5.78 Further details of the bus services, including route maps and service provision (at the time of assessment) in the Stone and Swynnerton area is provided in Annex B. Figure B8 illustrates the bus routes and Tables B10 - B14 provide details of the bus service provision.

Public transport interchanges

5.5.79 There are no substantial public transport interchange facilities in the Stone and Swynnerton area.

Pedestrians, cyclists and equestrians

5.5.80 There are pedestrian footways adjacent to many of the roads in Stone, a network of advisory cycle routes and several bridleways in the vicinity of the Proposed Scheme. The following sections identify the pedestrian, cycle and equestrian facilities in the study area.

Pedestrian facilities

5.5.81 Within Stone, the majority of roads generally have footways. The main pedestrian routes within the town centre are routed along Crown Street, Newcastle Street, Radford Street, Christchurch Way and High Street. These roads have wide pedestrian footways on both sides of the carriageways, and a number of pedestrian crossing facilities are provided throughout the town centre in the form of pedestrian islands and signalised crossings. Footways are also provided on A520 Stafford Road, creating a continuous pedestrian route between the settlements of Stone and Walton.

5.5.82 In addition to the pedestrian facilities on the public highway, there are a number of PRoW in the Stone area and these provide connections to Limekiln Lock on the Trent and Mersey Canal, Walton Bridge and Little Stoke. These PRoW are listed below.

Cycle facilities

5.5.83 NCN route 5 passes through the area on an off-road route along the canal towpath running between Stone and Walton. In addition to this off-road route, there is a network of advisory routes in Stone and Walton, which provide access to surrounding residential areas and Stone town centre. The following roads are advisory cycle routes:

- High Street, through Stone town centre;
- Meaford Road, between Stone and Barlaston;
- Old Road/Oulton Road, between Stone and Oulton;
- Mount Road, between Stonefield and Stone town centre; and
- Stafford Road, between Stone and Walton.

Equestrian facilities

5.5.84 There are three bridleways and one BOAT in the vicinity of the Proposed Scheme in the Stone and Swynnerton area and these are listed under below.

5.5.85 Following engagement between SCC and the North Staffordshire Bridleways Association, there are thirteen roads in the vicinity of the Proposed Scheme which are considered particularly important to equestrians. These include those listed below, as well as a claimed bridlepath[52] either side of Chorlton Mill rail bridge (using Chapel and Hill Chorlton Footpath 4, Whitmore Footpath 8 and Swynnerton Footpaths 58 and 10).

5.5.86 The roads indicated by the North Staffordshire Bridleway Association as being of importance to equestrians are as follows:

- Pirehill Lane/Green Lane, between the settlements of Whitgreave and Walton;
- B5026 Eccleshall Road, from its junction with Pirehill Lane as far as the M6 overbridge;
- Yarnfield Lane, between Yarnfield village and A34 The Fillybrooks;
- High Lows Lane extending from its junction with Yarnfield Lane, Yarnfield;
- Winghouse Lane, running adjacent to the M6 from its junction with the A51 Bury Bank;
- A51 Stone Road, from Winghouse Lane to the western side of the M6 overbridge;
- Unnamed road, between the A51 Stone road and the centre of Swynnerton village;
- A51 Stone Road, between Lower Hatton corner and the west of the M6 overbridge;
- Bottom Lane, between the A51 Stone Road and A519 Newcastle Road near Beech;
- A519 Newcastle Road, between Bottom Lane and Newcastle Road, Cotes Heath;

[52] A 'claimed bridlepath' is where an application has been made to the local authority for a modification to the Definitive Map of PRoW by amending the designation of an existing footpath or footpaths as bridleways, based on historic rights of access, usage by, or suitability for, equestrians

- Dog Lane, between the A51 The Rowe and Drayton Road, Hanchurch Hills;
- Unnamed road at Shelton-under-Harley Farm, between its junction with Bent Lane and Dog Lane; and
- Bent Lane, between the A51 The Rowe and Three Mile Lane (northernmost end extends into the Whitmore Heath to Madeley area).

Public rights of way

5.5.87 The baseline survey report (see BID-TR-001-000) provides a summary of the PRoW survey data within the Stone and Swynnerton area in close proximity to the Proposed Scheme. For ease of reference the PRoW data has been presented for each parish within the area from south to north. The following PRoW are in close proximity to the Proposed Scheme:

- Stone Rural Bridleway 0.1135 – between North Pirehill Farm and Pirehill Grange Farm;
- Stone Rural Footpath 28 – from the west of the A34 Stone Road in Aston-by-Stone, as far as the Stone/Whitgreave parish boundary;
- Stone Rural Footpath 32 – from Common Lane, Walton as far as the pedestrian underpass routing under the M6;
- Stone Rural Footpath 33 – from Yarnfield Lane as far the western side of the M6 carriageway;
- Stone Rural BOAT 34 – from Swynnerton parish boundary just east of the M6 to the A51 Stone Road by Bury Bank Nurseries;
- Swynnerton Footpath 10 – between Bent Lane and the rail line to the north of Stableford Bridge;
- Swynnerton Footpath 15 – between the A51 The Rowe and Dog Lane;
- Swynnerton Footpath 17 – between a farm located adjacent to the west of the M6 and Hall Lane, Swynnerton;
- Swynnerton Footpath 27 – between the Stone Rural/Swynnerton parish boundary and Grange Cottages on Hall Lane, Swynnerton;
- Swynnerton Footpath 52 – between the Dog Lane/Drayton Road junction and Common Lane, Upper Hatton; and
- Swynnerton Bridleway 54 – between the Dog Lane/Drayton Road junction and Common Lane, Upper Hatton. With Swynnerton Footpath 52 this is part of a route promoted by SCC and known as Hanchurch.

Waterways/canals

5.5.88 There is one navigable waterway situated in the Stone to Swynnerton area, which is the Trent and Mersey Canal. There is also a canal boat marina located at Aston-by-Stone, known as Aston Marina, which has capacity for 200 narrow boats. Neither the canal nor marina are located in close proximity to the route of the Proposed Scheme.

5.6 Whitmore Heath to Madeley area

Study area

5.6.1 Roads potentially affected by the Proposed Scheme in the Whitmore Heath to Madeley area include the M6, the A51 Nantwich Road/London Road, the A53 Newcastle Road/Whitmore Road, the A525 Bar Hill/ Newcastle Road, the A5182 Trentham Road and local roads serving the settlements of Whitmore, Baldwin's Gate, Madeley and Woore.

5.6.2 The WCML traverses the Whitmore Heath to Madeley area in a north to south alignment, although there are no railway stations in the area. The location of the key transport infrastructure can be found in Figure B4 and Figure B9 (see Annex B).

Local land uses

5.6.3 The Whitmore Heath to Madeley area is predominantly rural in nature, comprising largely of fields, small towns, villages and hamlets. Just beyond the eastern boundary of the Whitmore Heath to Madeley area is the city of Stoke-on-Trent and the town of Newcastle-under-Lyme, with respective populations of approximately 470,000 and 75,000[48].

Surveys

5.6.4 Traffic surveys were undertaken in 2015 within the months of November and December, with additional surveys undertaken in 2016 within February, March, July and November and further surveys undertaken in March 2017. Non-motorised user surveys were undertaken in June 2016 and April 2017 to establish the usage of roads and PRoW by pedestrians, cyclists and equestrians in the area of the route of the Proposed Scheme. The survey types and locations are shown in the baseline survey report (see BID-TR-001-000), alongside the summarised survey data.

Traffic surveys

5.6.5 The traffic surveys comprised of ATCs on links and MCCs and QLSs at junctions across the study area. Where possible, ATC data was gathered for a two week period. In total, 30 transport surveys have been undertaken in the Whitmore Heath to Madeley area.

5.6.6 In addition to the newly commissioned surveys, existing transport survey data has been obtained from SCC and Highways England including ATCs, MCCs and QLSs.

Non-motorised user surveys

5.6.7 As appropriate to the role of the PRoW, these surveys covered weekday and weekend use. The surveys included:

- roads and associated footways intersected by the Proposed Scheme and those potentially affected by proposed construction works; and
- PRoW intersected or likely to be affected routes including footpaths, bridleways, cycleways and canal towpaths.

Highway network

Strategic and primary 'A' road network

5.6.8 There is one strategic road which runs through the study area. The M6 runs along a north-west to south-east alignment along the eastern boundary of the Whitmore Heath to Madeley area. M6 junction 15 (located in the Stone and Swynnerton area) provides connections to Stoke-on-Trent and Newcastle-under-Lyme. The M6 does not cross the alignment of the Proposed Scheme in the Whitmore Heath to Madeley area. It is expected that this section of the M6 will be used as a main access route for construction traffic.

5.6.9 The A53 Newcastle Road has a north-east/south-west alignment and links the A51 Nantwick Road/Stone Road to Newcastle-under-Lyme in this area. The A53 Newcastle Road also routes through the settlements of Baldwin's Gate and Whitmore. The A53 Newcastle Road crosses the alignment of the Proposed Scheme between Baldwin's Gate and Whitmore at which point the A53 Newcastle Road is a single carriageway road with a 60mph speed limit. Elsewhere the speed limit of the A53 Newcastle Road varies, in particular through built up areas where it reduces. It is expected that the A53 Newcastle Road will be used as a main access route for construction traffic.

5.6.10 The A51 Nantwich Road/London Road runs on a broadly north-west to south-east alignment between the A53 Newcastle Road and the A525 Bar Hill Road in this area. It is a single carriageway road which generally has a 60mph speed restriction, aside from built up areas where the speed limit reduces. It does not cross the alignment of the Proposed Scheme. It is expected to be used as a main access route for construction traffic.

5.6.11 The A525 Bar Hill Road connects the A51 London Road/Nantwich Road at Woore in Shropshire to Newcastle-under-Lyme in an east to west alignment. The A525 Bar Hill Road routes through the settlements of Onneley, Madeley and Madeley Heath, also serving as the main point of access to Keele University.

5.6.12 The A525 Bar Hill Road crosses the alignment of the Proposed Scheme, just west of the village of Madeley. In this area, the A525 Bar Hill Road is a single carriageway road with a 60mph speed limit. Elsewhere the speed limit of the A525 Bar Hill Road varies, in particular through built up areas where it reduces. It is expected that the A525 Bar Hill Road will be used as an access route to construction compounds.

5.6.13 The A5182 Trentham Road runs in a broadly east - west direction and connects the A53 Newcastle Road to the M6 at junction 15. The A5182 Trentham Road is a single carriageway road with a speed limit of 60mph. The A5182 Trentham Road does not cross the alignment of the Proposed Scheme. It is, however, expected to be used as a primary access route for construction traffic.

5.6.14 Figure B4 (see Annex B) illustrates the strategic, primary and local road network in the Whitmore Heath to Madeley area.

Local road network

5.6.15 There are a number of lower order roads which cross the alignment of the Proposed Scheme and these include:

- Bent Lane, between A53 (Whitmore) and Dog Lane;
- Heath Road, north of Common Lane (Baldwin's Gate);
- Snape Hall Road, between Birch Tree Lane and Heath Road;
- Manor Road, between A525 Bar Hill (Madeley) and Holly Bush Lane; and
- Bower End Lane, west of Moss Lane (Madeley).

Baseline traffic flows

5.6.16 The baseline traffic flows for strategic and primary 'A' roads are summarised for the Whitmore Heath to Madeley area, in Table 76 below. Table 77 provides baseline traffic flows for local roads in the area.

Table 76: Whitmore Heath to Madeley strategic and primary 'A' road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A51 at Willoughbridge (between Maerway Lane and London Road	NB	143	4	179	2	1833	35
	SB	193	4	190	3	1985	45
A51 London Road (between Newcastle Road and Yew Tree Lane)	NB	264	3	216	2	2689	42
	SB	164	6	285	4	2566	49
A51 London Road (between London Road and Newcastle Road)	NB	325	14	337	10	3377	115
	SB	275	5	331	2	3186	65
A51 London Road (between Yew Tree Lane and Checkley Lane)	NB	223	5	242	4	2466	48
	SB	186	6	229	2	2423	51
A51 Nantwich Road (between Newcastle Road and Maerway Lane)	WB	147	4	218	3	1932	40
	EB	446	5	232	3	2445	51
A51 Nantwich Road (between Newcastle Road and Stone Road)	WB	812	61	535	22	6915	380
	EB	504	38	805	33	6721	325
A53 Newcastle Road (between Bent Lane and the Proposed Scheme)	WB	430	48	694	20	6071	436
	EB	773	25	449	23	6601	312
A53 Newcastle Road (between Holly Bush Lane and Nantwich Road)	WB	341	44	385	16	4200	401
	EB	588	24	389	25	5655	322
A53 Newcastle Road (between the Proposed Scheme and Common Lane)	WB	430	48	694	20	6071	436
	EB	773	25	449	23	6601	312
A53 Newcastle Road (between Madeley Road and Holly Bush Lane)	WB	654	50	429	25	5468	447

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	EB	330	25	431	25	3845	299

Table 77: Whitmore Heath to Madeley local road network 2016 baseline flows (vehicles)

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A525 Bar Hill Lane (between Red Lane and the Proposed Scheme)	EB	166	6	123	5	1476	57
	WB	141	5	154	1	1508	32
A525 Bar Hill Lane (between Red Lane and Manor Road)	EB	181	1	146	2	1544	23
	WB	134	3	153	0	1505	20
A525 Bar Hill Road (between Gravenhunger Moss and the Proposed Scheme)	EB	172	7	152	3	2051	66
	WB	140	8	176	5	1999	85
A525 Newcastle Road (between Gravenhunger Moss and London Road)	EB	139	1	111	2	1235	19
	WB	98	3	135	1	1226	20
Madeley Road (between Holly Bush Lane and Newcastle Road)	WB	101	8	61	4	879	73
	EB	59	5	73	4	713	56
Manor Road (between Bar Hill and the Proposed Scheme)	SB	53	3	51	2	550	19
	NB	57	3	47	1	547	15
Manor Road (between the Proposed Scheme and Camp Hill)	NB	60	5	71	1	675	27
	SB	93	3	51	2	737	21

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
Three Mile Lane (between Newcastle Road and Lymes Road)	NB	115	1	52	1	626	8
	SB	33	1	84	0	551	7
Bower End Lane (between Moss Lane and the Proposed Scheme)	WB	2	0	5	0	40	3
	EB	3	0	3	0	32	5
Moss Lane (between Bar Hill and Bower End Lane)	NB	25	0	24	0	181	2
	SB	17	0	18	0	156	1
Holly Bush Lane (between Newcastle Road and Madeley Road)	NB	60	5	71	1	675	27
	SB	93	3	51	2	737	21
Heath Road (between Common Lane and the Proposed Scheme)	NB	3	0	2	0	25	1
	SB	6	0	2	0	39	1
Heath Road (between Common Lane and the Proposed Scheme)	NB	0	0	1	0	12	1
	SB	1	0	0	0	12	0
Common Lane (between Newcastle Road and Heath Road)	WB	27	2	14	1	205	11
	EB	7	0	20	1	138	6
Red Lane (between Bar Hill and north of the Proposed Scheme)	SB	2	0	1	0	7	0
	NB	1	0	1	0	6	0

Junction operation

5.6.17 The operation of the key junctions that could be affected by the Proposed Scheme works, or will potentially be used as the main access routes from the SRN through the study area to the construction sites, have been assessed and the results are summarised below.

5.6.18 Junctions 9 software has been used to calculate the existing capacity of all priority controlled junctions within the study area. LINSIG software has been used to calculate the existing capacity of all signal controlled junctions.

5.6.19 Junctions 9 calculates RFC and queue for each approach to a junction. The RFC indicates the likely performance of a junction under a given set of traffic flows and the queue represents a typical queue found at the end of each time segment within the modelled time period. LINSIG calculates the DoS and MMQ for each approach under a given set of traffic flows, with the MMQ the average maximum queue modelled within each traffic signal cycle.

5.6.20 At over 85% to 90% DoS or 0.85 to 0.9 RFC, queues are likely to increasingly occur. Consequently permanent highway infrastructure is generally designed to stay below this level. At over 100% DoS or 1.0 RFC, if sustained over time, the level of traffic cannot be accommodated. This is referred to as 'theoretical maximum capacity'. In congested urban areas, junctions often operate at or above the theoretical capacity for short periods.

5.6.21 Where two DoS values are presented in the results tables, this provides the value for both the approach lane and its respective flare. All queue lengths and traffic flow inputs to both the LINSIG and Junctions 9 models are presented in PCUs.

5.6.22 The results for the Whitmore Heath to Madeley area are presented in the order of roundabout junctions followed by priority controlled (give-way) junctions.

A53 Whitmore Road/A5182 Trentham Road

5.6.23 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 78.

Table 78: 2016 baseline performance at A53 Whitmore Road/A5182 Trentham Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A53 Whitmore Road	249	0.19	0
A5182 Trentham Road	304	0.23	0
A53 from A5192 Trentham Road to Bent Lane	844	0.42	1
	2016 PM (17:00 - 18:00) baseline results		
A53 Whitmore Road	474	0.35	1
A5182 Trentham Road	382	0.32	1
A53 from A5192 Trentham Road to Bent Lane	554	0.28	0

5.6.24 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Nantwich Road/A53 Newcastle Road/A51 Stone Road

5.6.25 This junction is a priority controlled (give way) crossroads junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 79.

Table 79: 2016 baseline performance at A51 Nantwich Road/A53 Newcastle Road/A51 Stone Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A53 Newcastle Road (left)	6	0.14	0
A53 Newcastle Road (right)	370	0.92	8
A51 Stone Road (east) (ahead + right)	0	0	0
A51 Stone Road (east) (ahead)	183	-	-
A51 Nantwich Road (west) (left)	678	-	-
A51 Nantwich Road (west) (ahead)	159	-	-
	2016 PM (17:00 - 18:00) baseline results		
A53 Newcastle Road (left)	3	1.14	1
A53 Newcastle Road (right)	451	1.11	34
A51 Stone Road (east) (ahead + right)	0	0	0
A51 Stone Road (east) (ahead)	357	-	-
A51 Nantwich Road (west) (left)	410	-	-
A51 Nantwich Road (west) (ahead)	147	-	-

5.6.26 The model shows that this junction operates close or over its capacity on the A53 Newcastle Road arm in the AM and PM peak periods, with an RFC of 0.92 and 1.14 and a corresponding queue length of eight and 35 PCUs respectively.

A51 Nantwich Road/A525 Audlem Road

5.6.27 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 80.

Table 80: 2016 baseline performance at A51 Nantwich Road/A525 Audlem Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A525 Audlem Road (west) (left + right)	144	0.34	1
A51 Nantwich Road (south) (ahead + right)	6	0.01	0
A51 Nantwich Road (south) (ahead)	198	-	-
A51 Nantwich Road (north) (left)	91	-	-
A51 Nantwich Road (north) (ahead)	321	-	-
	2016 PM (17:00 - 18:00) baseline results		
A525 Audlem Road (west) (left + right)	73	0.18	0
A51 Nantwich Road (south) (ahead + right)	23	0.03	0
A51 Nantwich Road (south) (ahead)	296	-	-
A51 Nantwich Road (north) (left)	103	-	-
A51 Nantwich Road (north) (ahead)	238	-	-

5.6.28 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Nantwich Road/A525 Newcastle Road/A51 London Road

5.6.29 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 81.

Table 81: 2016 baseline performance at A51 Nantwich Road/A525 Newcastle Road/A51 London Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A525 Newcastle Road (east) (left + right)	151	0.34	1
A51 London Road (south) (ahead + right)	163	0.23	1
A51 London Road (south) (ahead)	269	-	-
A51 Nantwich Road (north) (left)	75	-	-
A51 Nantwich Road (north) (ahead)	238	-	-
	2016 PM (17:00 - 18:00) baseline results		
A525 Newcastle Road (east) (left + right)	152	0.33	1
A51 London Road (south) (ahead + right)	88	0.13	0
A51 London Road (south) (ahead)	228	-	-
A51 Nantwich Road (north) (left)	62	-	-
A51 Nantwich Road (north) (ahead)	309	-	-

5.6.30 The model shows that this junction operates well within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A525 Bar Hill/Manor Road

5.6.31 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 82.

Table 82: 2016 baseline performance at A525 Bar Hill/Manor Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Manor Road (left + right)	65	0.16	0
A525 Bar Hill (west) (ahead + right)	8	0.01	0
A525 Bar Hill (west) (ahead)	179	-	-
A525 Bar Hill (east) (left)	49	-	-
A525 Bar Hill (east) (ahead)	131	-	-
	2016 PM (17:00 - 18:00) baseline results		
Manor Road (left + right)	49	0.12	0
A525 Bar Hill (west) (ahead + right)	6	0.01	0
A525 Bar Hill (west) (ahead)	136	-	-
A525 Bar Hill (east) (left)	42	-	-
A525 Bar Hill (east) (ahead)	150	-	-

5.6.32 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A53 Newcastle Road/Common Lane

5.6.33 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 83.

Table 83: 2016 baseline performance at A53 Newcastle Road/Common Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Common Lane (left + right)	26	0.09	0
A53 Newcastle Road (east) (ahead + right)	10	0.02	0
A53 Newcastle Road (east) (ahead)	459	-	-
A53 Newcastle Road (west) (left)	3	-	-
A53 Newcastle Road (west) (ahead)	827	-	-
	2016 PM (17:00 - 18:00) baseline results		
Common Lane (left + right)	14	0.04	0
A53 Newcastle Road (east) (ahead + right)	73	0.08	0
A53 Newcastle Road (east) (ahead)	708	-	-
A53 Newcastle Road (west) (left)	1	-	-
A53 Newcastle Road (west) (ahead)	488	-	-

5.6.34 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/Gravenhunger Lane/A51 Pipegate/B5026 London Road

5.6.35 This junction is a priority controlled (give way) staggered with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 84.

Table 84: 2016 baseline performance at A51 London Road/Gravenhunger Lane/A51 Pipegate/B5206 London Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Gravenhunger Lane (left + right)	6	0.01	0
A51 London Road (north) (left)	2	-	-
A51 London Road (north) (ahead)	154	-	-
A51 London Road (north) (right)	129	-	-
A51 London Road (north) (ahead + right)	171	0.27	1
A51 London Road (north) (ahead)	117	-	-
B5026 London Road (left + right)	208	0.37	1
A51 Pipegate (south) (left)	22	-	-
A51 Pipegate (south) (ahead)	134	-	-
A51 Pipegate (south) (right)	0	-	-
A51 Pipegate (south) (straight + right)	5	0.01	0
A51 Pipegate (south) (ahead)	300	-	-
	2016 PM (17:00 - 18:00) baseline results		
Gravenhunger Lane (left + right)	0	0	0
A51 London Road (north) (left)	2	-	-
A51 London Road (north) (ahead)	196	-	-
A51 London Road (north) (right)	169	-	-
A51 London Road (north) (ahead + right)	233	0.36	1
A51 London Road (north) (ahead)	131	-	-
B5026 London Road (left + right)	174	0.3	1
A51 Pipegate (south) (left)	20	-	-
A51 Pipegate (south) (ahead)	177	-	-
A51 Pipegate (south) (right)	3	-	-
A51 Pipegate (south) (straight + right)	14	0.02	0
A51 Pipegate (south) (ahead)	326	-	-

5.6.36 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 Nantwich Road/A53 Newcastle Road (west)

5.6.37 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 85.

Table 85: 2016 baseline performance at A51 Nantwich Road/A53 Newcastle Road (west) junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A53 Newcastle Road (left + right)	338	0.93	9
A51 Nantwich Road (west) (ahead + right)	7	0.01	0
A51 Nantwich Road (west) (ahead)	498	-	-
A51 Nantwich Road (east) (left)	387	-	-
A51 Nantwich Road (east) (ahead)	149	-	-
	2016 PM (17:00 - 18:00) baseline results		
A53 Newcastle Road (left + right)	309	0.85	5
A51 Nantwich Road (west) (ahead + right)	3	0.01	0
A51 Nantwich Road (west) (ahead)	248	-	-
A51 Nantwich Road (east) (left)	549	-	-
A51 Nantwich Road (east) (ahead)	256	-	-

5.6.38 The model shows that this junction is approaching capacity on the A53 arm in both the AM and PM peak periods. The results show an RFC value of 0.93 and 0.85 and corresponding queue lengths of nine and five PCUs in the AM and PM respectively.

Accidents and safety

5.6.39 Road traffic collisions are referred to as accidents in this report. This provides consistency of reporting with the HS2 Phase One ES. Accident records have been obtained from the information provided by SCC. This report considers the three years from 30 April 2012 to 30 April 2015.

5.6.40 Within the Whitmore Heath to Madeley area, a total of 109 accidents occurred over the three year period, of which 101 (92.7%) were recorded as slight, 5 (4.6%) as serious and 3 (2.8%) as fatal.

5.6.41 Regarding the roads where accidents occurred, 31.2% of the accidents in the Whitmore Heath to Madeley area were located on the M6, followed by the A525 Newcastle Road/Barhill Road/Audlem Road (17.4%), the A519 Newcastle Road (14.7%) and Westbury Road, Newcastle-under-Lyme (11.0%).

5.6.42 There were 14 accidents involving non-motorised users (i.e. pedestrians, cyclists, equestrians or mobility scooters). Most of these pedestrian and cycling related accidents occurred on Westbury Road, (28.6%) and A525 Bar Hill (21.4%).

5.6.43 No accident clusters were identified within the Whitmore Heath to Madeley area (i.e. locations recording nine or more accidents over the three years for which data was analysed).

5.6.44 The baseline survey report (see BID-TR-001-000) illustrates the location of every accident recorded in the Whitmore Heath to Madeley area over the three years between April 2012 and April 2015. Severity is shown depending on icon colour (green:

slight, yellow: serious; red: fatal). Pedestrian icons show pedestrian and cycling related accidents.

Parking and loading

5.6.45 There is no designated parking or loading identified in the area that is expected to be impacted by the Proposed Scheme.

Public transport

5.6.46 The Whitmore Heath to Madeley area is rural in nature and therefore relatively limited in terms of public transport provision. This is primarily focused on the local centres of Stoke-on-Trent and Newcastle-under-Lyme to the east of the area. However, there are buses serving other localities in the Whitmore Heath to Madeley area including Baldwin's Gate, Whitmore and Madeley.

5.6.47 The following sections describe the available public transport provision in the Whitmore Heath to Madeley area at the time of assessment.

Rail network

5.6.48 The WCML traverses the Whitmore Heath to Madeley area in a broadly north-west to south-east alignment, and runs between Norton Bridge and Crewe. Virgin Trains operates intercity services along the route but as there are no stations within the area, all services pass through and do not stop.

5.6.49 Figure B9 (see Annex B) illustrates the rail network in the Whitmore Heath to Madeley area.

Local bus services

5.6.50 Bus service provision in the Whitmore Heath to Madeley area is focused on the major urban settlements of Stoke-on-Trent and Newcastle-under-Lyme with nearly all bus services from the surrounding areas terminating at these local centres. The rural nature of the area means that the level of bus service provision to and from some areas within the area is restricted to a few buses per day.

5.6.51 Buses travelling through the Whitmore Heath to Madeley area use the following corridors:

- the A53 Newcastle Road via Whitmore and Baldwin's Gate is served by one bus service, the number 164 which provides connections to Newcastle-under-Lyme, Hanley, Market Drayton and Loggerheads; and
- the A525 Bar Hill Road from Woore which is served by two bus services, numbers 79 and 85B that provide connections to Crewe, Hanley, Newcastle-under-Lyme, Nantwich, and Madeley. The frequent service 25 from Newcastle-under-Lyme to Keele University also uses part of this corridor, west of the route of the Proposed Scheme.

5.6.52 Further details of the bus services, including route maps and service provision (at the time of assessment) in the Whitmore Heath to Madeley area is provided in Annex B. Figure B9 illustrates the bus routes and Tables B15 - B16 provide details of the bus service provision.

Public transport interchanges

5.6.53 There are no public transport interchange facilities in the Whitmore Heath to Madeley area.

Pedestrians, cyclists and equestrians

5.6.54 There are pedestrian footways adjacent to many of the roads in the built up areas of Madeley, Baldwin's Gate and Woore. There are a network of advisory cycle routes and several bridleways in the vicinity of the Proposed Scheme. The following sections identify the pedestrian, cycle and equestrian facilities in the study area.

Pedestrian facilities

Madeley

5.6.55 There are pedestrian footways adjacent to many of the roads, particularly on all residential streets within Madeley. The A525 Bar Hill/Poolside/Newcastle Road passes through the village in a north/south alignment, and has footways from approximately 370m west of the A515/Red Lane junction, as far as the adjacent village of Madeley Heath.

5.6.56 In addition to the pedestrian facilities on the public highway, there are a number of PRoW in the Madeley area. Those in the vicinity of the Proposed Scheme provide connections to Baldwin's Gate, Wrinehill, Madeley Heath, Newcastle-under-Lyme, Keele and outlying rural areas. They are listed below.

Baldwin's Gate

5.6.57 Within Baldwin's Gate, the main road and residential streets generally have footways. The A53 Newcastle Road passes through the village in a south-west/north-east alignment, and has footways as far as its junction with Madeley Road to the south-west. At this point, the footway narrows but continues for another 500m as far as the A53 Newcastle Road/Holly Bush Lane junction. In a north-westerly direction, the footway on the north-western side of the A53 carriageway continues as far as the adjacent village of Whitmore.

5.6.58 In addition to the pedestrian facilities on the public highway, there are a number of PRoW in the Baldwin's Gate area. Those in the vicinity of the Proposed Scheme provide connections to Loggerheads, Madeley, Whitmore and Chapel Chorlton, and are listed below.

Woore

5.6.59 Within Woore, the main road and residential streets generally have footways. The A51 London Road passes through the village in a north-south alignment, becoming A51 Nantwich Road north of the junction with the A525 Audlem Road. The A51 has footways until 150m north of the junction with A525 Audlem Road to the north; and to beyond the B5026 London Road at Ireland's Cross to the south.

5.6.60 The A525 Newcastle Road towards Madeley crosses the A51 in the centre of the village, becoming A525 Audlem Road to the west. This has footways as far as the junction with Gravenhunger Lane to the east.

5.6.61 In addition to the pedestrian facilities on the public highway, there are a several PRoW in and around Woore, some of which form routes across the county boundary into Staffordshire (e.g. to Onneley and Aston), while others lead further into Shropshire.

Cycle facilities

Madeley

5.6.62 There are no dedicated cycle facilities in the Madeley area. However, there are a number of on-road advisory cycle routes, including:

- A525 Poolside, from its junction with Furnace Lane, as far as its junction with Manor Road. This route then continues to the south, providing access to Madeley Park and Baldwin's Gate;
- from the southern end of Heighley Castle Way, crossing over the A531 Main Road onto Heighley Lane, and continuing to Heighley in the north;
- A525 Newcastle Road, from its junction with Beck Road as far as its junction with Agger Hill; and
- Leycett Lane, from its junction with A525 Newcastle Road to the village of Leycett.

Baldwin's Gate

5.6.63 There are no dedicated cycle facilities in Baldwin's Gate. However, there are a number of on-road advisory cycle routes, including:

- the A53 Newcastle Road, between its junction with Common Lane and its junction with Madeley Road;
- Heath Road, from its junction with Common Lane, along an unnamed lane to the north, then in a south-east alignment until it connects with Three Mile Lane in Whitmore;
- Sandy Lane, from its junction with A53 Newcastle Road then continuing on Woodside as far as its junction with the A51 Nantwich Road;
- Madeley Road, starting from its junction with the A53 Newcastle Road. This route can be followed in a westerly direction along Camp Hill, Radwood Lane and Holloway Lane, towards the villages of Aston and Minn Bank; and
- Manor Road, from its junction with Madeley Road as far as Madeley village.

Woore

5.6.64 There are no dedicated cycle facilities or advisory cycle routes in and around Woore.

Equestrian facilities

5.6.65 There are three bridleways that are PRoW in the vicinity of the Proposed Scheme in the Whitmore Heath to Madeley area and these are listed below.

5.6.66 In addition, following engagement between SCC and the North Staffordshire Bridleways Association, there are four roads in the vicinity of the Proposed Scheme in

the Whitmore Heath to Madeley area that are considered to be important links to equestrians. These are as follows:

- Heath Road, between Common Lane and Snape Hall Road;
- Manor Road, between A525 Bar Hill in Middle Madeley and the A53 Newcastle Road, Baldwin's Gate;
- A525 Bar Hill, between the settlements of Onneley and Madeley; and
- Bower End Lane, between Bower End farm and the residential estate adjacent to the existing rail line.

Public rights of way

5.6.67 The baseline survey report (see BID-TR-001-000) provides a summary of the PRoW survey data within the Whitmore Heath to Madeley area in close proximity to the Proposed Scheme. For ease of reference the PRoW data has been presented for each parish within the area from south to north. The following PRoW are in close proximity to the Proposed Scheme:

- Whitmore Footpath 4 – from the west of Whitmore village to the Common Lane/A53 Newcastle Road junction, Baldwin's Gate;
- Whitmore Footpath 5 – between Whitmore Footpath 6 north-west of Snape Hall Road and Footpath 18 east of Manor Road;
- Whitmore Footpath 6 – from farmland to the north of Baldwin's Gate, as far as Snape Hall Road;
- Madeley Bridleway 1 – between the River Lea and the A525 Bar Hill/Red Lane junction, Madeley;
- Madeley Bridleway 2 – between A531 Main Road and School Lane, Onneley;
- Madeley Bridleway 5 – from just south of Checkley Lane, as far as Bower End Lane;
- Madeley Footpath 6 – from the eastern side of School Lane, as far as Bower End Lane;
- Madeley Footpath 7 – from the western side of the rail line as far as School Lane, Onneley;
- Madeley Footpath 14 – from the intersection with Whitmore Footpath 6 to Netherset Hey Lane;
- Madeley Footpath 24 – from the A525 Bar Hill, on the eastern boundary of Madeley village terminating at a farm some 200m south-west of Bower End Lane;
- Madeley Footpath 26 – from west of a WCML overbridge to Bower End Lane; and

- Madeley Footpath 28 – from the River Lea, west of the WCML, following the course of the river and terminating just south of the confluence of the River Lea and Checkley Brook.

Waterways/canals

5.6.68 There are no navigable waterways situated in the Whitmore Heath to Madeley area.

5.7 South Cheshire area

Study area

5.7.1 Roads potentially affected by the Proposed Scheme include the M6, the A500 Shavington Bypass/Newcastle Road, the A531 Newcastle Road, the A51 Nantwich Bypass /London Road, the A5020 Weston Road/University Way/David Whitby Way, the A534 Crewe Road/Nantwich Road, the A532 Weston Road, and the B5071 Gresty Road/Jack Mills Way/Crewe Road and local roads in the area south of the A500. The Proposed Scheme will end to the south of the A500 Shavington Bypass, with works also proposed at the existing Crewe railway station.

5.7.2 The WCML traverses the South Cheshire area in a north to south alignment with additional branch lines heading to North Wales, Manchester and Derby. The location of the key transport infrastructure can be found in Figure B5 and Figure B10 (see Annex B).

Local land uses

5.7.3 The area in the vicinity of the Proposed Scheme in the South Cheshire area is predominantly urban in nature, with the town of Crewe comprising much of the area. Crewe is a major public transport interchange and has a population of approximately 72,000. The remainder of the area is rural, comprising largely of fields, villages and hamlets including Basford, Betley, Blakenhall, Checkley, Chorlton, Hough, Shavington and Weston.

Surveys

5.7.4 Initial traffic surveys were undertaken in 2015 within November and December, with additional surveys undertaken in 2016 within the months of February, March, July and November and further surveys undertaken in March 2017. Non-motorised user surveys were undertaken in June 2016 and April 2017 to establish the usage of roads and PRoW by pedestrians, cyclists and equestrians in the area of the route of the Proposed Scheme. The survey types and locations are shown in the baseline survey report alongside the summarised survey data.

Traffic surveys

5.7.5 The traffic surveys comprise of ATCs on road links and MCCs and QLSs at junctions across the study area. Where possible, ATC data was gathered for a two week period. In total, 70 transport surveys have been undertaken in the South Cheshire area.

5.7.6 In addition to the newly commissioned surveys, existing transport survey data has been obtained from CEC. These include ATCs and MCCs.

Non-motorised user surveys

5.7.7 As appropriate to the role of the PRoW, these surveys covered weekday and weekend use. The surveys included:

- roads and associated footways intersected by the Proposed Scheme and those potentially affected by proposed construction works; and
- PRoW intersected or likely to be affected routes including footpaths, bridleways, cycleways and canal towpaths.

Highway network

Strategic and primary 'A' road network

5.7.8 There is one strategic road which runs to the east of Crewe and the study area, the M6, which is a three lane motorway with a hard shoulder and has a speed limit of 70mph and runs in a north-south alignment and (with the A500 Shavington Bypass) connects Crewe with Newcastle-under-Lyme and Stoke-on-Trent in this locality and Stafford further south. This section of the M6 will be used as a main access route for construction traffic. Junction 16, a grade separated junction, is the primary access into Crewe via the A500 Newcastle Road from the M6. This route will also be used as a main access route for construction traffic; however the Proposed Scheme does not intersect with the M6 in the South Cheshire area.

5.7.9 The A500 Newcastle Road/Shavington Bypass provides an east to west connection through the South Cheshire area, and links Nantwich to the south of Crewe and the M6 at junction 16. The A500 Newcastle Road/Shavington Bypass provides access to a number of smaller villages and hamlets including Blakelow, Shavington, Weston and Barthomley, which are all connected to the route via roundabout junctions with local roads. In addition, there are several over-bridges that allow north-south connections across the A500 Shavington Bypass. Between M6 junction 16 and A51 Nantwich Bypass, the A500 Shavington Bypass is a dual carriageway, with a 60mph speed restriction. The Proposed Scheme does not intersect with the A500 Shavington Bypass in the South Cheshire area, however it is expected that the A500 will be a main access route for construction traffic between M6 junction 16 and Crewe.

5.7.10 The A532 West Street/Macon Way (that becomes A532 Weston Road south of the A534 Nantwich Road junction) runs through Crewe town centre in a broadly north-west to south-east alignment. The route provides a connection between the A530 Middlewich Road to the west of Crewe, the A534 (Crewe Road to the east; Nantwich Road to the west), and the A5020 University Way, which leads to the A500 Shavington Bypass to the south of Crewe by two routes – A5020 David Whitby Way (previously the "Crewe Green Link Road Phase 2"), and A5020 Weston Road to the Meremoor roundabout.

5.7.11 The A532 West Street/Macon Way also provides access to a number of key destinations within Crewe including the town centre, Grand Junction Retail Park, Manchester Metropolitan University Cheshire Campus and Crewe Railway Station (west of Crewe Arms roundabout). The Proposed Scheme will run to the west of the Weston Road section of the A532, parallel to the existing WCML.

5.7.12 The A534 Crewe Road/Nantwich Road provides a north-east to south-west connection through the centre of Crewe between Nantwich and Sandbach. East of the A532 West Street/Macon Way, the A534 Crewe Road/Nantwich Road is a dual carriageway subject to varying speed restrictions throughout its length. Passing Crewe station and further west, it is a busy two-lane 30mph road through the Nantwich Road shopping area with closely-spaced junctions and crossings. The A534 Crewe Road/Nantwich Road serves a number of key destinations within Crewe town centre, including the university, Crewe Station, and the Alexandra Stadium.

5.7.13 The A531 Newcastle Road runs in a broadly south-west to north-east alignment between A500 Shavington Bypass/Newcastle Road at Meremoor Roundabout to the south-east of Crewe and Madeley Heath. The road routes via the smaller settlements of Balterley Heath, Betley and Wrinehill, also passing close to Chorlton and Weston. For the majority of its length the A531 Crewe Road is a single carriageway road with a 60mph speed limit, which drops to 30mph in Wrinehill and Betley.

5.7.14 Figure B5 (see Annex B) illustrates the strategic, primary and road network in the South Cheshire area.

Local road network

5.7.15 The A5020 University Way/David Whitby Way, which follows a north to south alignment and connects the A534 Crewe Road/Nantwich Road to the A500 Shavington Bypass. The A5020 is a single carriageway road with a 40mph speed limit.

5.7.16 The A51 Nantwich Bypass runs in a broadly north/south alignment, and connects a number of primary 'A' roads to the west of Crewe. The Bypass is a single carriageway road subject to a 60mph speed limit.

5.7.17 The B5071 Crewe Road/Jack Mills Way/Gresty Road runs in a broadly north south alignment to the west of the WCML and connects the A500 University Way with central parts of Crewe. This road is single carriageway and has variable speed limits.

5.7.18 There are a number of lower order roads which cross, or run close to, the alignment of the Proposed Scheme and are therefore likely to be affected by the Proposed Scheme. These are:

- Checkley Lane, between A531 Main Road and A51 London Road;
- Den Lane, between A531 Main Road and Wrinehill Road;
- Waybutt Lane, between Chorlton Lane and A531 Newcastle Road;
- Chorlton Lane, between Newcastle Road and Waybutt Lane;
- Newcastle Road, between the A500 Shavington Bypass/A51 Nantwich Road/Stone Road/London Road/Nantwich Bypass roundabout and the A531 Crewe Road;
- Casey Lane, between Weston Lane and Newlands Road; and
- Weston Lane, between Main Road, Weston and Crewe Road, Shavington.

Baseline traffic flows

5.7.19 The baseline traffic flows for strategic and primary 'A' roads are summarised for the South Cheshire area, in Table 86. Table 87 provides baseline traffic flows for local roads in the area.

Table 86: South Cheshire strategic and primary 'A' highway network 2016 baseline flows

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
M6 (between M6 Junction 16 slip road and B5078 Radway Green Road)	NB	3667	785	4026	619	57599	10832
	SB	3965	812	4391	768	62572	12181
A500 Newcastle Road (between M6 junction 16 and Meremoor roundabout)	WB	1184	152	1272	89	15379	1881
	EB	1048	124	1152	59	13776	1428
A500 Shavington Bypass (between A5020 David Whitby Way and the Proposed Scheme)	WB	974	98	1018	43	10430	1050
	EB	809	81	899	49	8946	973
A500 Shavington Bypass (between the Proposed Scheme and B5071 Jack Mills Way)	WB	974	98	1018	43	10430	1050
	EB	809	81	899	49	8946	973
A500 Shavington Bypass (between B5071 Jack Mills Way and Rope Lane)	WB	815	85	967	38	9900	973
	EB	758	69	767	44	8472	899
A500 Shavington Bypass (between Rope Lane and A51 Nantwich Bypass)	WB	888	63	1151	41	10070	707
	EB	1034	55	916	51	10469	697
A51 Elwood Way (between A51 Newcastle Road and A51 London Road)	SB	520	10	855	6	7214	180
	NB	777	31	636	14	7339	214
A51 London Road (between Annions Lane and First Dig Lane)	NB	196	7	186	8	1774	68
	SB	172	7	169	7	1772	67
A51 London Road (between B5071 Crewe Road and Annions Lane)	NB	180	8	187	8	1702	72
	SB	152	6	153	7	1689	71
A51 London Road (between Back Lane and Wybunbury Road)	NB	164	7	165	7	1693	66

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	129	10	150	2	1590	66
A51 London Road (between Checkley Lane and Mill Lane)	NB	217	9	203	5	2398	78
	SB	196	9	213	4	2338	78
A51 London Road (between First Dig Lane and Wybunbury Lane)	NB	284	8	316	4	2772	85
	SB	337	9	246	3	2846	84
A51 London Road (between Mill Lane and Back Lane)	NB	218	5	230	3	2382	46
	SB	193	3	225	3	2344	37
A51 London Road (between Wybunbury Lane and A51 Elwood Way)	NB	339	8	368	5	3449	85
	SB	318	7	334	2	3546	82
A51 Newcastle Road (between A51 Nantwich Bypass and A51 Elwood Way)	WB	778	18	1018	16	9360	231
	EB	766	20	859	9	9205	217
A531 Crewe Road (between Bowsey Wood Road and A525 Newcastle Road)	NB	394	4	234	1	2079	20
	SB	182	2	285	1	1903	15
A531 Main Road (between Checkley Lane and Bowsey Wood Road)	SB	452	12	333	2	3079	89
	NB	308	7	379	3	2694	64
A531 Main Road (between Waybutt Lane and Checkley Lane)	SB	341	6	394	2	2943	29
	NB	338	4	315	1	2933	31
A531 Newcastle Road (between A500 Shavington Bypass and Main Road)	SB	264	20	289	7	2779	157
	NB	213	8	166	3	1907	65
A531 Newcastle Road (between Main Road and B5500 Balterley Green Road)	EB	522	16	599	9	4274	107

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	WB	516	20	424	8	3584	125
A531 Newcastle Road (between Waybutt Lane and B5500 Balterley Green Road)	EB	522	16	599	9	4274	107
	WB	516	20	424	8	3584	125
A534 Nantwich Road (between A532 Weston Road and A5019 Mill Street)	WB	805	18	878	19	12343	284
	EB	909	20	660	6	11509	203
A532 Weston Road (between A534 Nantwich Road and A5020 University Way)	NB	727	14	400	17	6068	182
	SB	300	14	616	7	4935	173

Table 87: South Cheshire local highway network 2016 baseline flows

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
A5020 David Whitby Way (between A500 Shavington Bypass and A532 Weston Road)	NB	1146	34	546	25	7894	385
	SB	324	13	892	8	6333	227
A525 Bar Hill (between Moss Lane and New Road)	SB	194	3	239	2	2283	31
	NB	231	4	200	2	2317	36
A525 Newcastle Road (between New Road and A531 Crewe Road)	NB	251	2	232	1	2885	23
	SB	264	3	340	3	3072	28
B5071 Bridge Street (between Back Lane and Wrinehill Road)	NB	194	5	215	4	2024	34
	SB	193	1	189	1	1921	12
B5071 Crewe Road (between Weston Lane and B5071 Jack Mills Way)	SB	203	10	367	5	3590	91
	NB	290	8	257	5	3444	81
B5071 Crewe Road (between Weston Lane and Newcastle Road)	SB	168	2	274	1	2684	23
	NB	276	3	231	1	2892	17
B5071 Jack Mills Way (between Crewe Road and Link Road/junction with Crewe Road)	WB	136	6	241	2	2490	64
	EB	245	9	239	4	3196	95
B5071 Wybunbury Road (middle of Wybunbury Road and London Road)	NB	114	0	116	0	1082	5
	SB	78	1	88	0	973	7
B5071 Wybunbury Road (between Back Lane and middle of Wybunbury Road)	NB	108	1	106	1	1091	11
	SB	96	1	95	0	993	5
Bowsey Wood Road (between A531 Main Road and A525 Newcastle Road)	NB	90	0	62	1	779	11

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	SB	68	2	98	0	791	12
Checkley Lane (between the Proposed Scheme and A531 Main Road)	EB	63	2	44	0	525	16
	WB	46	2	45	0	446	15
Casey Lane (between Back Lane and the Proposed Scheme)	NB	52	0	12	1	242	6
	SB	8	1	17	0	96	4
Casey Lane (between the Proposed Scheme and Weston Lane)	NB	52	0	12	1	242	6
	SB	8	1	17	0	96	4
Checkley Lane (between A51 London Road and the Proposed Scheme)	EB	67	3	41	1	500	22
	WB	47	3	43	1	419	19
Chorlton Lane (between the Proposed Scheme and Waybutt Lane)	EB	5	0	3	0	35	2
	WB	5	0	2	0	29	2
Chorlton Lane (between Waybutt Lane and Newcastle Road)	NB	16	1	7	0	129	4
	SB	8	0	12	0	113	4
Den Lane (between Mill Lane and Den Lane)	EB	21	1	10	0	155	11
	WB	6	0	18	0	120	5
Mill Lane (between Beech Farm and A51 London Road)	WB	11	0	13	1	100	4
	EB	7	0	11	0	98	2
Mill Lane (between Den Lane and Beech Farm)	SB	7	0	7	0	75	3
	NB	8	0	6	0	73	2
Middle section of Wrinehill Road	EB	18	0	15	0	174	6

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	WB	15	1	18	0	150	3
Newcastle Road (between Casey Lane and the Proposed Scheme)	WB	372	20	480	5	3835	120
	EB	381	14	350	7	3289	98
Newcastle Road (between Chorlton Lane and the Proposed Scheme)	WB	372	20	480	5	3835	120
	EB	381	14	350	7	3289	98
Newcastle Road (between Chorlton Lane and A531 Newcastle Road)	WB	365	17	382	6	3099	117
	EB	367	17	387	6	3126	118
Waybutt Lane (south of Chorlton Lane)	SB	1	0	0	0	15	2
	NB	0	0	1	0	8	0
Waybutt Lane (west of A531 Newcastle Road)	EB	5	0	2	0	36	0
	WB	10	0	2	0	67	2
Weston Lane (between Crewe Road and the Proposed Scheme)	WB	58	2	120	1	711	13
	EB	123	1	59	1	726	11
Weston Lane (between Casey Lane and Cemetery Road)	WB	69	2	138	1	794	18
	EB	173	2	67	1	918	17
Weston Lane (between Casey Lane and Larch Avenue)	WB	58	2	120	1	711	13
	EB	123	1	59	1	726	11
Wrinehill Road (between Bridge Street and Wrinehill Road/east-bound)	EB	84	0	67	0	707	7
	WB	64	0	85	0	662	7
Wrinehill Road (between Wrinehill Road east-bound and Cobbs Lane)	EB	81	0	63	0	662	5

Location	Direction	2016 baseline AM peak (08:00 - 09:00)		2016 baseline PM peak (17:00 - 18:00)		AADT	
		All vehicles	HGV	All vehicles	HGV	All vehicles	HGV
	WB	63	0	84	0	647	6
Wrinehill Road (east of Cobbs Lane)	SB	20	2	21	1	218	15
	NB	20	1	19	1	197	8
Wrinehill Road (north-west of Mill Lane)	EB	25	1	15	1	177	5
	WB	12	1	20	0	154	3

Junction operation

5.7.20 The operation of the key junctions that could be affected by the Proposed Scheme, or will potentially be used as the main access routes from the SRN through the study area to the construction sites, have been assessed and the results are summarised below.

5.7.21 Junctions 9 software has been used to calculate the existing capacity of all priority controlled junctions within the study area. LINSIG software has been used to calculate the existing capacity of all signal controlled junctions.

5.7.22 Junctions 9 calculates the RFC and queue for each approach to a junction. The RFC indicates the likely performance of a junction under a given set of traffic flows and the queue represents a typical queue found at the end of each time segment within the modelled time period. LINSIG calculates the DoS and MMQ for each approach under a given set of traffic flows, with the MMQ the average maximum queue modelled within each traffic signal cycle.

5.7.23 At over 85% to 90% DoS or 0.85 to 0.9 RFC, queues are likely to increasingly occur. Consequently permanent highway infrastructure is generally designed to stay below this level. At over 100% DoS or 1.0 RFC, if sustained over time, the level of traffic cannot be accommodated. This is referred to as 'theoretical maximum capacity'. In congested urban areas, junctions often operate at or above the theoretical capacity for short periods.

5.7.24 Where two DoS values are presented in the results tables, this provides the value for both the approach lane and its respective flare. All queue lengths and traffic flow inputs to both the LINSIG and Junctions 9 models are presented in PCUs.

5.7.25 The results for the South Cheshire area are presented in the order of roundabout junctions, priority controlled (give-way) and signalised junctions.

A51 Newcastle Road/ A51 Nantwich Bypass/A500 Shavington Bypass

5.7.26 This junction is a five-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown Table 88.

Table 88: 2016 baseline performance at A51 Newcastle Road/A51 Nantwich Bypass/A500 Shavington Bypass junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 Nantwich Bypass	833	0.58	2
Cheerbrook Road	189	0.18	0
A500 Shavington Bypass	1007	0.43	1
A51 Newcastle Road (north)	388	0.35	1
Newcastle Road (west)	968	0.72	3
	2016 PM (17:00 - 18:00) baseline results		
A51 Nantwich Bypass	991	0.68	2
Cheerbrook Road	160	0.16	0
A500 Shavington Bypass	1304	0.59	2
A51 Newcastle Road (north)	275	0.3	0
Newcastle Road (west)	892	0.67	2

5.7.27 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A500 Shavington Bypass/B5071 Jack Mills Way

5.7.28 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 89.

Table 89: 2016 baseline performance at A500 Shavington Bypass/B5071 Jack Mills Way junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
B5071 Jack Mills Way (north)	329	0.21	0
A500 Shavington Bypass (east)	1131	0.48	1
B5071 Road (south)	297	0.23	0
A500 Shavington Bypass (west)	1135	0.48	1
	2016 PM (17:00 - 18:00) baseline results		
B5071 Jack Mills Way (north)	531	0.3	0
A500 Shavington Bypass (east)	1602	0.72	3
B5071 Road (south)	169	0.17	0
A500 Shavington Bypass (west)	994	0.42	1

5.7.29 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A500 Shavington Bypass/A5020 Weston Road/A500 Newcastle Road/A531 Newcastle Road

5.7.30 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 90.

Table 90: 2016 baseline performance at A500 Shavington Bypass/A5020 Weston Road/A500 Newcastle Road/A531 Newcastle Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A5020 Weston Road	392	0.32	1
A500 Shavington Bypass (east)	1419	0.57	2
A531 Newcastle Road	235	0.25	0
A500 Newcastle Road (west)	993	0.45	1
	2016 PM (17:00 - 18:00) baseline results		
A5020 Weston Road	376	0.32	1
A500 Shavington Bypass (east)	1424	0.58	1
A531 Newcastle Road	176	0.18	0
A500 Newcastle Road (west)	1218	0.53	1

5.7.31 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Newcastle Road/Main Road/A531 Newcastle Road

5.7.32 This junction is a four-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 91.

Table 91: 2016 baseline performance at Newcastle Road/Main Road/A531 Newcastle Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Main Road	176	0.13	0
A531 Newcastle Road (east)	293	0.22	0
A531 Newcastle Road (south)	854	0.56	1
Newcastle Road (west)	393	0.3	0
	2016 PM (17:00 - 18:00) baseline results		
Main Road	437	0.31	1
A531 Newcastle Road (east)	376	0.33	1
A531 Newcastle Road (south)	524	0.35	1
Newcastle Road (west)	375	0.25	0

5.7.33 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A500 Shavington Bypass/A5020 David Whitby Way

5.7.34 This junction is a three-arm roundabout junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 92.

Table 92: 2016 baseline performance at A500 Shavington Bypass/A5020 David Whitby Way

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
A5020 David Whitby Way	385	0.21	0
A500 Shavington Bypass (east)	1275	0.57	1
A500 Shavington Bypass (west)	1831	0.83	5
	2016 PM (17:00 - 18:00) baseline results		
A5020 David Whitby Way	922	0.51	1
A500 Shavington Bypass (east)	1212	0.6	2
A500 Shavington Bypass (west)	1469	0.64	2

5.7.35 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/Checkley Lane/Hunsterson Road

5.7.36 This junction is a priority controlled (give way) crossroads junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 93.

Table 93: 2016 baseline performance at A51 London Road/Checkley Lane/Hunsterson Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Checkley Lane (ahead + left + right)	40	0.08	0
A51 London Road (north) (ahead + left + right)	36	0.06	0
A51 London Road (north) (left)	19	-	-
A51 London Road (north) (ahead)	150	-	-
Hunsterson Road (ahead + left + right)	50	0.1	0
A51 London Road (south) (ahead + left + right)	45	0.07	0
A51 London Road (south) (left)	18	-	-
A51 London Road (south) (ahead)	185	-	-
	2016 PM (17:00 - 18:00) baseline results		
Checkley Lane (ahead + left + right)	43	0.08	0
A51 London Road (north) (ahead + left + right)	14	0.02	0
A51 London Road (north) (left)	6	-	-
A51 London Road (north) (ahead)	180	-	-
Hunsterson Road (ahead + left + right)	37	0.07	0
A51 London Road (south) (ahead + left + right)	36	0.05	0
A51 London Road (south) (left)	9	-	-
A51 London Road (south) (ahead)	186	-	-

5.7.37 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/Mill Lane

5.7.38 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 94.

Table 94: 2016 baseline performance at A51 London Road/Mill Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Mill Lane (left + right)	9	0.02	0
A51 London Road (south) (straight + right)	0	0	0
A51 London Road (south) (ahead)	218	-	-
A51 London Road (north) (left)	2	-	-
A51 London Road (north) (ahead)	198	-	-
	2016 PM (17:00 - 18:00) baseline results		
Mill Lane (left + right)	6	0.01	0
A51 London Road (south) (straight + right)	8	0.01	0
A51 London Road (south) (ahead)	219	-	-
A51 London Road (north) (left)	10	-	-
A51 London Road (north) (ahead)	199	-	-

5.7.39 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/B5071 Wybunbury Road/B5071 Crewe Road

5.7.40 This junction is a priority controlled (give way) staggered crossroad junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 95.

Table 95: 2016 baseline performance at A51 London Road/B5071 Wybunbury Road/B5071 Crewe Road junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
B5071 Wybunbury Road (ahead + left + right)	95	0.24	0
A51 London Road (north) (ahead + left + right)	21	0.03	0
A51 London Road (north) (left)	38	-	-
A51 London Road (north) (ahead)	127	-	-
B5071 Crewe Road (ahead + left + right)	85	0.2	0
A51 London Road (south) (ahead + left + right)	16	0.02	0
A51 London Road (south) (left)	5	-	-
A51 London Road (south) (ahead)	163	-	-
	2016 PM (17:00 - 18:00) baseline results		
B5071 Wybunbury Road (ahead + left + right)	86	0.2	0

Approach	Flow, PCU/hr	RFC	Queue, PCU
A51 London Road (north) (ahead + left + right)	8	0.01	0
A51 London Road (north) (left)	6	-	-
A51 London Road (north) (ahead)	111	-	-
B5071 Crewe Road (ahead + left + right)	103	0.23	0
A51 London Road (south) (ahead + left + right)	10	0.02	0
A51 London Road (south) (left)	2	-	-
A51 London Road (south) (ahead)	127	-	-

5.7.41 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Newcastle Road/Chorlton Lane

5.7.42 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 96.

Table 96: 2016 baseline performance at Newcastle Road/Chorlton junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Chorlton Lane (left + right)	20	0.05	0
Newcastle Road (west) (ahead + right)	17	0.02	0
Newcastle Road (west) (ahead)	378	-	-
Newcastle Road (east) (left)	9	-	-
Newcastle Road (east) (ahead)	382	-	-
	2016 PM (17:00 - 18:00) baseline results		
Chorlton Lane (left + right)	11	0.03	0
Newcastle Road (west) (ahead + right)	5	0.01	0
Newcastle Road (west) (ahead)	348	-	-
Newcastle Road (east) (left)	6	-	-
Newcastle Road (east) (ahead)	478	-	-

5.7.43 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

Newcastle Road/Casey Lane

5.7.44 This junction is a priority controlled (give way) T-junction with no controlled pedestrian crossing facilities. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 97.

Table 97: 2016 baseline performance at Newcastle Road/Casey Lane junction

Approach	Flow, PCU/hr	RFC	Queue, PCU
	2016 AM (08:00 - 09:00) baseline results		
Casey Lane (left + right)	40	0.08	0
Newcastle Road (east) (ahead + right)	64	0.09	0
Newcastle Road (east) (ahead)	320	-	-
Newcastle Road (west) (left)	8	-	-
Newcastle Road (west) (ahead)	371	-	-
	2016 PM (17:00 - 18:00) baseline results		
Casey Lane (left + right)	64	0.13	0
Newcastle Road (east) (ahead + right)	81	0.11	0
Newcastle Road (east) (ahead)	413	-	-
Newcastle Road (west) (left)	10	-	-
Newcastle Road (west) (ahead)	300	-	-

5.7.45 The model shows that this junction operates within capacity in the AM and PM peak hours with minimal queuing on all approaches.

A51 London Road/A530 Peter DeStapleigh Way/A51 Elwood Way

5.7.46 This junction is a four arm signalised junction with controlled pedestrian crossing facilities on the A51 (Elwood Way and London Road arms) and the A530 Peter DeStapleigh arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 98.

Table 98: 2016 baseline performance at A51 London Road/A530 Peter DeStapleigh Way/A51 Elwood Way junction

Approach	Flow, PCU	DoS	MMQ, PCU
	2016 AM (08:00 - 09:00) baseline results		
A51 London Road (north)	57	47%	2
A51 Elwood Way	638	53%	8
A530 Peter DeStapleigh Way	642	70%	12
A51 London Road (south)	384	57%	9
	2016 PM (17:00 - 18:00) baseline results		
A51 London Road (north)	36	30%	1
A51 Elwood Way	996	91%	21
A530 Peter DeStapleigh Way	387	43%	6
A51 London Road (south)	362	62%	9

5.7.47 The model shows that this junction operates close to its capacity in the PM peak with the A51 Elwood Way shown to have a DoS value of 91% and MMQ of 21 PCUs in the PM peak period.

A51 Elwood Way/B5074 Newcastle Road/A51 Newcastle Road

5.7.48 This junction is a three arm signalised junction with controlled pedestrian crossing facilities on the A51 Elwood Way (west) arm. The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 99.

Table 99: 2016 baseline performance at A51 Elwood Way/B5074 Newcastle Road/A51 Newcastle Road junction

	Flow, PCU	DoS	MMQ, PCU
Approach	**2016 AM (08:00 - 09:00) baseline results**		
A51 Elwood Way	871	88%	21
A51 Newcastle Road	916	90%	19
B5074 Newcastle Road	403	65%	6
	2016 PM (17:00 - 18:00) baseline results		
A51 Elwood Way	585	90%	17
A51 Newcastle Road	1136	96%	25
B5074 Newcastle Road	629	52%	6

5.7.49 The model shows that this junction operates close to its capacity in the AM and PM peak hours. The A51 Elwood Way is shown to have a DoS value of 88% in the AM peak and 90% in the PM peak, with MMQ of 21 and 17 PCUs respectively. The A51 Newcastle road is shown to have a DoS value of 90% in the AM peak and 96% in the PM peak, with MMQ of 19 and 25 PCUs respectively.

A534 Crewe Road/A532 Weston Road/A534 Nantwich Road/Tommy's Lane/A532 Macon Way (Crewe Arms roundabout)

5.7.50 This junction is a five arm signalised junction with controlled pedestrian crossing facilities on the A534 Crewe Road arm and the A532 (Weston Road and Macon Way arms). The existing operation of the junction has been assessed for the AM and PM peak hours as shown in Table 100.

Table 100: 2016 baseline performance at A534 Crewe Road/A532 Weston Road/A534 Nantwich Road/Tommy's Lane/A532 Macon Way (Crewe Arms roundabout) junction

Approach	Flow, PCU/hr	DoS	MMQ, PCU
	2016 AM (08:00 - 09:00) baseline results		
A532 Macon Way	294	88%	7
Tommy's Lane	40	7%	0
A534 Nantwich Road	1014	78%	18
A532 Weston Road - kerbside lane	321	83%	10
A532 Weston Road - farside lane	394	88%	10
A534 Crewe Road - kerbside lane	494	85%	13
A534 Crewe Road - farside lane	49	11%	1
	2016 PM (17:00 - 18:00) baseline results		
A532 Macon Way	272	72%	5
Tommy's Lane	58	11%	1
A534 Nantwich Road	956	88%	23
A532 Weston Road - kerbside lane	229	88%	9
A532 Weston Road - farside lane	380	95%	11
A534 Crewe Road - kerbside lane	581	92%	15
A534 Crewe Road - farside lane	121	29%	3

5.7.51 The model shows that this junction operates is approaching capacity in the AM and PM peak hours with queuing evident on the A534 Nantwich Road, A534 Crewe Road and A532 Weston Road approaches.

M6 junction 16

5.7.52 The AM and PM peak periods have been assessed at junction 16 of the M6, using the M6 junctions 13 - 15 SATURN model during the AM and PM peak hours, as shown in Table 101, for a 2012 baseline year.

Table 101: 2012 baseline results for the M6 junction 16

Approach	Flow, PCU/hr	V/C	Queue, PCU
	2012 AM (08:00 - 09:00) baseline results		
M6 south-bound off-slip	1313	91%	7
M6 south-bound on-slip	535	25%	0
M6 north-bound off-slip	524	44%	0
M6 north-bound on-slip	972	42%	0
A500 (T) exit to east	1911	49%	0
A500 (T) west-bound approach	1975	99%	6
A500 Alsager Road east-bound approach	805	58%	1
A500 Alsager Road exit to west	1382	100%	1
B5078 Radway Green Road approach	440	35%	0
B5078 Radway Green Road exit	257	19%	0
	2012 PM (17:00 - 18:00) baseline results		
M6 south-bound off-slip	1196	83%	6
M6 south-bound on-slip	331	16%	0
M6 north-bound off-slip	400	32%	0
M6 north-bound on-slip	1048	48%	0
A500(T) exit to east	2023	52%	0
A500(T) west-bound approach	1954	88%	1
A500 Alsager Road east-bound approach	973	71%	1
A500 Alsager Road exit to west	1275	92%	0
B5078 Radway Green Road approach	352	31%	1
B5078 Radway Green Road exit	188	14%	0

5.7.53 The model results show that during the 2012 baseline the southbound off-slip, west-bound approach from A500 (T) east and the west-bound exit to A500 Alsager Road are at or approaching capacity, during the AM and PM peaks. The other arms operate within capacity in 2012.

Accidents and safety

5.7.54 Road traffic collisions are referred to as accidents in this report. This provides consistency of reporting with the HS2 Phase One ES. Accident records have been obtained from the information provided by SCC and CEC. This report considers the three year periods available from 30 April 2012 until the 30 April 2015 for SCC (CAs 1-4) and 30 April 2011 to the 30 April 2014 for CEC (the South Cheshire area).

5.7.55 Within the South Cheshire area, a total of 1089 accidents occurred over the three year period, of which 909 (83.5%) were recorded as slight, 171 (15.7%) as serious and 9 (0.8%) as fatal.

5.7.56 Regarding the roads where accidents occurred, 18.5% of the accidents in the South Cheshire area occurred on urban roads, followed by the M6 (8.4%), and at several locations along the A534 corridor (5.3%).

5.7.57 There were 184 accidents involving non-motorised users (i.e., pedestrians, cyclists, equestrians or mobility scooters). Almost 20% of these types of accidents occurred on urban roads with 7% at several locations along the A534 corridor.

5.7.58 Five accident clusters were identified in the South Cheshire area (i.e. locations recording nine or more accidents over three years). Table 102 shows these accident clusters, their severity and the number of accidents involving pedestrians or cyclists.

Table 102: South Cheshire area accident cluster summary table

Location	Total Accidents	Slight	Serious	Fatal	Accidents Involving Pedestrians/Cyclists
A500 on its junction with the A531 and A5020 (Crewe)	10	9	1	0	1
B5338 Crewe Road on its junction with the A534 and Nantwich Bypass (Crewe)	10	8	2	0	1
A530 on its junction with Colleys Lane (Crewe)	11	9	2	0	4
A532 Vernon Way on its junction with Earle St (Crewe)	9	8	1	0	5
A5019 Vernon Way on its junction with the A5076 (Crewe)	10	9	1	0	5

5.7.59 Most of the accidents were recorded as slight, revealing no fatal accidents at these locations over the three year period assessed.

5.7.60 The baseline survey report (see BID-TR-001-000) illustrates the location of every accident recorded in the South Cheshire area over the three years between April 2011 and April 2014. Severity is shown depending on icon colour (green: slight, yellow: serious; red: fatal). Pedestrian icons show pedestrian and cycling related accidents.

Parking and loading

5.7.61 There are approximately 780 car parking spaces at Crewe Station located in two car parks, located off Pedley Street and the A532 Weston Road. Additionally, public car parking is available in privately operated car parks around the station area. The station also includes provision for drop-off on A534 Nantwich Road, short stay parking on Pedley Street and a taxi rank off the A532 Weston Road.

5.7.62 There are no designated parking or loading spaces identified in the area to the south of the A500 Newcastle Road/Shavington Bypass that are expected to be impacted by the Proposed Scheme.

Public transport

5.7.63 Public transport provision in the South Cheshire area is focused on the local centre of Crewe which is a major transport interchange in the area. Crewe is a major rail interchange and a convergence of five rail lines.

5.7.64 The following sections describe the available public transport provision in the South Cheshire area at the time of assessment.

Rail network

5.7.65 Crewe Railway Station is a major rail interchange providing access to a range of national and local rail services. Crewe Station was used by a little over 2.7 million passengers and handled almost 1.4 million interchange passengers in 2015/2016[23]. At Crewe Station, the WCML connects with the Crewe to Derby Line, the Crewe to Manchester Line, the Crewe to North Wales Line and the Crewe to Shrewsbury Line. Service frequencies to major destinations are typically:

- London Euston – four trains per hour in each direction;
- Liverpool Lime Street – two trains per hour in each direction;
- Manchester Piccadilly – four trains per hour in each direction;
- Birmingham New Street – three trains per hour in each direction; and
- Chester (North Wales) - two trains per hour in each direction.

5.7.66 Additionally, Crewe Station is also served by London Midland, connecting Crewe to major destinations in the Midlands and to London and Liverpool.

5.7.67 Figure B10 (see Annex B) illustrates the rail network in the South Cheshire area.

Local bus services

5.7.68 Service provision within the South Cheshire area focuses on the major urban settlement of Crewe, with the majority of bus services from the surrounding areas terminating at Crewe Bus and Coach Station, from which onwards connections to most other towns in Cheshire and Manchester, Liverpool and Stoke-on-Trent are available.

5.7.69 Buses travel through the South Cheshire area using the following four corridors:

- the A534 Nantwich Road, via Nantwich/Willaston and local roads via Shavington, which is served by four bus services, numbers 6/6E, 39, 44 and 84/C84, providing connections to Chester, Tarporley, Basford, Blakelow, Hough and Wybunbury;
- the A530 Middlewich Road, between Nantwich and Crewe, which is served by three bus services, numbers 1A,1B, and 38 (Sundays only), providing connections to Marshfield and Wistaston;
- the A534 Crewe Road, B5077 Slaughter Hill and Crewe Road, towards Alsager and Sandbach, which is served by three bus services, numbers 3, 37, and 38, providing connections to Stoke, Kidsgrove, Alsager, Sandbach, Radway Green, Haslington, Winterley and Wheelock; and
- the A531 Newcastle Road, via Weston and Wrinehill , which is served by one bus service, number 85, which provides connections to Newcastle under Lyme, Keele, Madeley, Betley and Balterley Heath.

5.7.70 Further details of the bus services, including route maps and service provision (at the time of assessment) in the South Cheshire area is provided in Annex B. Figure B10

illustrates the bus routes and Tables B17 - B20 provide details of the bus service provision.

Public transport interchanges

5.7.71 Crewe Station is located on the WCML and provides a multi-modal interchange for Crewe town centre. The railway station provides access to national and local rail services with a number of bus stops located directly adjacent on the A534 Crewe Road to facilitate easy interchange between both modes.

5.7.72 There are two car parks associated with Crewe Railway Station to facilitate park and ride trips. These are located on Pedley Street and Weston Road, and have capacity for up to 550 and 227 vehicles respectively.

5.7.73 A taxi rank and drop-off/pick-up area is located outside the station on the A534 Nantwich Road. Cycle parking for up to 185 bicycles is available in the form of stands and wheel racks.

Pedestrians, cyclists and equestrians

5.7.74 Dedicated pedestrian and cycle facilities vary throughout the South Cheshire area. Crewe is well served by pedestrian and cycle facilities, as is typical of an urban area. The more rural areas in the South Cheshire area are limited in terms of provision for cyclists and pedestrians, although there are a number of advisory cycle routes and PRoW routing through the area. The following sections identify the pedestrian, cycle and equestrian facilities in the South Cheshire area.

Pedestrian facilities

Crewe

5.7.75 Crewe has extensive footways which is typical of a built up urban area. Crewe Station is located to the south of the town centre, linked by the A5019 Mill Street and A5078 Edleston Road. The A534 Nantwich Road runs past the station and links across the south of the town. All routes in and around the rail station and the town centre have pedestrian footways, street lighting and controlled crossings.

5.7.76 Other important routes to the south of Crewe include: the A532 Weston Road, which extends south of A534 Crewe Road parallel to and east of the WCML and crosses the A5020 at the Savoy Road roundabout. The route then continues towards the Meremoor roundabout with the A500 Newcastle Road with Weston Road footway extending as far as Main Road, and these continue on into Weston village.

5.7.77 The A5020 University Way runs from Crewe Green roundabout to the A500 Shavington Bypass, again with pedestrian footways along its entire length. It becomes the recently-built A5020 David Whitby Way after the Savoy Road roundabout and has segregated pedestrian/cycle lanes along one side.

5.7.78 The B5071 Gresty Road/Jack Mills Way/Crewe Road similarly parallels the WCML to the west, meeting the A500 Shavington Bypass, with pedestrian footways on Gresty Road and cycle lanes on the recently built Jack Mills Way section, as far as the roundabout north of Shavington.

5.7.79 In addition to on-highway pedestrian facilities there are a limited number of PRoW to the south of Crewe, including ones which link to the networks in the neighbouring areas of Shavington and Weston in the vicinity of the Proposed Scheme and the urban parish of Wistaston north of A500 Shavington Bypass.

Shavington and Hough

5.7.80 Within Shavington, the roads generally have footways. Newcastle Road passes through the village in an east - west alignment, and has footways from its junction with Wybunbury Road to the west as far as the adjacent village of Hough to the east. Crewe Road runs along the eastern side of Shavington in a north - south alignment. This road has footways along its entire length, providing a continuous pedestrian route into Crewe.

5.7.81 Rope Lane runs between Main Road and Crewe Road, and passes over the A500 via a road/footbridge. Footways are located along the entire length of Rope Lane, connecting Shavington and the Wells Green area of Crewe.

5.7.82 In addition to the pedestrian facilities on the public highway, there are a number of PRoW in the Shavington area, providing connections to Hough and Wybunbury.

5.7.83 The neighbouring village of Hough itself only has footways on Newcastle Road bordering the northern edge of the village, with most residential streets only having narrow grass verges between carriageway and building frontages. One PRoW in Hough runs towards Chorlton and towards the route of the Proposed Scheme; this is listed below. Other PRoW link Hough to Shavington, Chorlton and Basford.

Weston and Chorlton

5.7.84 Despite Weston being a relatively small settlement, the majority of roads have footways. Main Road passes along the eastern boundary of the village, and connects Weston Road and the A531/Newcastle Road. Newcastle Road continues south as the A531, linking Weston and Chorlton with other small settlements such as Wrinehill and Betley, but has no footways or cycle lanes.

5.7.85 There are a number of PRoW in Weston and surrounding areas, some of which link to the networks in the vicinity of the Proposed Scheme, which provide connections to Chorlton, Basford and Crewe.

5.7.86 Chorlton village sits south of Newcastle Road from Weston, to which it is linked by Chorlton Lane and footpaths. Within Chorlton, pedestrian facilities are limited, with only narrow grass verges along the main routes of Chorlton Lane and Waybutt Lane and no pedestrian or cycle provision on residential roads.

Cycle facilities

Crewe

5.7.87 There are a number of off-road cycle paths in Crewe and those in close proximity to the Proposed Scheme :

- from the Macon Way/A534 Crewe Road/Weston Road/Nantwich Road roundabout, as far as approximately 0.5km north on Macon Way;

- from the Macon Way/A534 Crewe Road/Weston Road/Nantwich Road roundabout, to approximately 150m north on Macon Way, then along a cycle path linking into Lynbrook Road; and
- from the Macon Way/A534 Crewe Road/Weston Road/Nantwich Road roundabout, along Crewe Road and Crewe Green Road to the east, as far as the Crewe Green Road/University Way/B5077 Crewe Road/A534 Crewe Road/Nantwich Road/Sydney Road roundabout. This route then continues to the south along University Way, as far as Weston Road.

Shavington

5.7.88 There is one off-road cycle route in Shavington. This is located on Rope Lane, from its junction with Eastern Road/Gresty Lane, as far as approximately 40m south-east of the Rope Lane bridge over the A500 Shavington Bypass.

5.7.89 In addition to this, an advisory on-road route, which is part of the National Route 551, passes along the northern boundary of Shavington. This route connects with the off-road cycle route on Rope Lane and continues in an easterly direction via Chestnut Avenue, B5071 Crewe Road and Weston Lane towards Basford.

Weston

5.7.90 There are no traffic-free cycle routes in Weston or the surrounding area. However, National Route 551 passes through Weston, starting at Main Road then continuing via Cemetery Road and Weston Lane. Approximately 160m east of the WCML on Weston Road, the route continues on Casey Lane to the south as Regional Route 70, and crosses the rail line before connecting with Newcastle Road in Hough, then Cobbs Lane to Wybunbury to the south-west.

Equestrian facilities

5.7.91 There are three bridleways that are PRoW in the vicinity of the Proposed Scheme in the South Cheshire area and these are listed below.

5.7.92 In addition, following engagement between CEC and the North Staffordshire Bridleways Association, there are eleven roads in the vicinity of the Proposed Scheme which are considered important to equestrians. These are as follows:

- Checkley Lane, between the existing railway crossing and A51 London Road;
- Unnamed road at Checkley, between where it forms a junction with Checkley Lane and Checkley Wood Farm;
- Den Lane, from the existing railway crossing to the north of Wrinehill, as far as Wrinehill Road;
- Mill Lane, from Blakenhall Farm to Mill Lane/Den Lane junction;
- Waybutt Lane, between Chorlton Lane and A531 Newcastle Road;
- Chorlton Lane, between Newcastle Road and Waybutt Lane;
- Newcastle Road, between Hough village and the A531/Newcastle Road/Main Road roundabout near Weston Hall;

- Casey Lane, between Hough village and the Casey Lane/Weston Lane junction;
- Weston Lane, from its junction with Back Lane in Basford, as far as the Mill Lane/Whites Lane/Cemetery Road crossroads in Weston village;
- Whites Lane, between its junction with Main Road and the Mill Lane/Weston Lane/Cemetery Road crossroads in Weston village; and
- Cemetery Road, from the Mill Lane/Weston Lane/Whites Lane crossroads in Weston village, to its junction with Main Road.

Public rights of way

5.7.93 The baseline survey report (see BID-TR-001-000) provides a summary of the PRoW survey data within the South Cheshire area in close proximity to the Proposed Scheme. The following PRoW are in close proximity to the Proposed Scheme:

- Checkley cum Wrinehill Footpath 4 – between the Staffordshire/Cheshire East County boundary and unnamed road south of Checkley Lane;
- Checkley cum Wrinehill Footpath 5 – between Checkley Lane and Footpath 8;
- Checkley cum Wrinehill Footpath 8 – between the Staffordshire/Cheshire East County boundary and Checkley Lane;
- Checkley cum Wrinehill Footpath 9 – between Checkley Lane and Footpath 15 at the WCML footbridge;
- Checkley cum Wrinehill Footpath 15 – between the WCML footbridge and Footpath 9 and Blakenhall Footpath 17 at the parish boundary;
- Blakenhall Footpath 7 – from the west of Betley Common to the north of Den Lane;
- Blakenhall Bridleway 8 – from 200m north of the Staffordshire /Cheshire East County boundary and the junction with Bridleway 12;
- Blakenhall Footpath 9 – between Mill Lane and Higher Den Farm, Den Lane;
- Blakenhall Footpath 11 – from a junction with Bridleway 12 in agricultural land north of Den Lane to the junction with Hough Footpath 11 at the parish boundary;
- Blakenhall Bridleway 12 – from Den Lane to the junction with Chorlton Bridleway 12 south of Waybutt Lane, Chorlton;
- Blakenhall Footpath 17 – from a junction with Checkley cum Wrinehill Footpath 15 in agricultural land on the western side of the rail line, to a junction with Footpath 4 north of Checkley Lane;
- Chorlton Bridleway 2 – from a junction with Blakenhall Bridleway 12 at the Parish boundary to the south end of Waybutt Lane in Chorlton village;
- Chorlton Footpath 3 – from a junction with Hough Footpath 11 west of the WCML to Waybutt Lane in Chorlton village;

- Chorlton Footpath 7 – between a junction with Footpath 1 and Hough Footpath 8 to Chorlton Methodist Church on Chorlton Lane;
- Chorlton Footpath 8 – from a junction with Footpath 7 west of the WCML to Newcastle Road west of the junction with Casey Lane;
- Chorlton Footpath 9 – between Chorlton Lane north of the village to a junction with Basford Footpath 4 at the parish boundary just north of Newcastle Road;
- Chorlton Footpath 11 – from the north side of Newcastle Road west of the WCML to a junction with Footpath 17 just west of the WCML;
- Chorlton Footpath 12 – from Chorlton Lane west of the WCML alongside the line to a junction with Footpaths 7 and 9, just east of the WCML footbridge;
- Chorlton Footpath 13 – from Chorlton lane north of the village, across a WCML footbridge to a junction with Footpath 12 on the western side;
- Chorlton Footpath 17 – from a junction with Footpath 11 north of Newcastle Road and west of the WCML, to Basford Footpath 5 at the parish boundary;
- Basford Footpath 3 – between Casey Lane just south of Weston Road, to a junction with Weston Footpath 4 at the parish boundary at Basford Brook;
- Basford Footpath 4 – from a junction with Chorlton Footpath 9 just north of Newcastle Road to a junction with Footpath 3 just east of Casey Lane; and
- Basford Footpath 5 – from a junction with Chorlton Footpath 9 just north of Newcastle Road to a junction with Casey Lane, opposite Footpath 10.

Waterways/canals

5.7.94 There are no navigable waterways or canals in the South Cheshire area.

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