

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 4 | Off-route effects

November 2013

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Department
for Transport

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Structure of the HS2 Phase One Environmental Statement

The Environmental Statement (ES) documentation comprises:

- Non-technical summary (NTS) - which provides a summary in non-technical language of the Proposed Scheme, the likely significant environmental effects of the Proposed Scheme, both beneficial and adverse, and the means to avoid or reduce the adverse effects;
- Volume 1: Introduction to the ES and the Proposed Scheme. This describes High Speed Two (HS2), and the environmental impact assessment process, the approach to consultation and engagement, details of the permanent features and generic construction techniques as well as a summary of main strategic and route-wide alternatives and local alternatives (prior to 2012) considered;
- Volume 2: Community forum area reports and map books - 26 reports and associated map books providing a description of the scheme and of environmental effects in each area;
- Volume 3: Route-wide effects - provides an assessment of the effects of the Proposed Scheme where it is not practicable to describe them within the CFA descriptions in Volume 2;
- Volume 4: Off-route effects - provides an assessment of the off-route effects of the Proposed Scheme;
- Volume 5: Appendices and map books – contains supporting environmental information and associated map books; and
- Glossary of terms and list of abbreviations – contains terms and abbreviations, including units of measurement, used throughout the ES documentation.

1 Introduction

1.1 Introduction to HS2

- 1.1.1 High Speed Two (HS2) is a new high speed railway proposed by the Government to connect major cities in Britain. Stations in London, Birmingham, Leeds, Manchester, South Yorkshire and the East Midlands will be served by high speed trains running at speeds of up to 360kph (225mph).
- 1.1.2 HS2 is proposed to be built in two phases. Phase One, the subject of this ES, will involve the construction of a new railway line of approximately 230km (143 miles) between London and Birmingham. Construction will begin in 2017 and the line will become operational by 2026; with a connection to the West Coast Main Line (WCML) near Lichfield and to the existing HS1 railway line in London.
- 1.1.3 During Phase One beyond the dedicated high speed track, high speed trains will connect with and run on the existing WCML to serve passengers beyond the HS2 network to destinations in the north. A connection to HS1 will also allow some services to access that high speed line through east London and Kent and connect with mainland Europe via the Channel Tunnel.
- 1.1.4 Phase Two will involve the construction of lines from Birmingham to Leeds and Manchester; with construction commencing approximately 2023, and planned to be operational by 2033.
- 1.1.5 Section 4 of Volume 1 describes the anticipated operational characteristics of HS2, including the anticipated frequency of train services. As Volume 1 shows, the frequency of trains is expected to increase over time and to increase further upon opening of Phase Two. In assessing the environmental effects of the Proposed Scheme the anticipated Phase 2 operational frequency has been used.
- 1.1.6 The Government believes that the HS2 network should link to Heathrow and its preferred option is for this to be built as part of Phase Two. However, the Government has since taken the decision to pause work on the Heathrow link until after 2015 when it expects the Airports Commission to publish its final report on recommended options for maintaining the country's status as an international aviation hub.
- 1.1.7 For consultation and environmental assessment purposes, the proposed Phase One route has been divided into 26 community forum areas (CFA). This has enabled wider public engagement on the Proposed Scheme design and on the likely adverse and beneficial effects.

1.2 Purpose of this report

- 1.2.1 This report presents those aspects of the construction and operation of the Proposed Scheme that have the potential to generate significant environmental effects in locations remote to the route corridor (i.e. 'off-route'). The nature of the Proposed Scheme means that such effects are principally, but not exclusively, related to implications for other transport infrastructure.

- 1.2.2 CFA reports 1-26 (Volume 2) and the route-wide effects report (Volume 3) present the likely significant effects generated 'on-route'; that is to say within the route corridor and the local environment from London Euston station to Birmingham Curzon Street station and Handsacre.
- 1.2.3 Off-route effects are defined as those that may occur at locations beyond the Proposed Scheme's route corridor and its associated local environment, and which are not covered within the spatial scope of the CFA reports (Volume 2) or Volume 3.
- 1.2.4 The off-route effects assessment considers environmental effects in relation to changes and/or works at off-route rail stations and rail depots, modifications to the WCML between Lichfield and Colwich and the replacement Heathrow Express (HEX) and First Great Western (FGW) depots.
- 1.2.5 Figure 1 identifies specific off-route stations and depots referred to in this report.

Figure 1: Locations of off-route stations and depots



1.3 Structure of this report

1.3.1 This report is divided into three main sections:

- Section 1 sets out the purpose of this report;
- Section 2 provides an overview of the scope of the assessment and a description of the aspects of construction and operation of the Proposed Scheme that may give rise to off-route effects; and
- Sections 3 to 7 include five off-route environmental topic assessments. The methodologies used for the assessments contained within this report vary from one environmental topic to another. For the majority of locations, there are limited potential environmental effects and therefore a reduced scope of relevant environmental topics has been considered. Each section explains which environmental topics were included or excluded from the scope. Where appropriate, the environmental baseline, an assessment of construction and operational effects, the proposed mitigation measures, and likely significant residual effects are reported.

2 Approach to the assessment of off-route effects

2.1 Introduction

- 2.1.1 This section presents the approach to the assessment of off-route effects. It outlines the screening and scoping approach adopted in order to focus the assessment on the likely significant effects on off-route receptors as a result of construction and operation of the Proposed Scheme.
- 2.1.2 The Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) set out the geographic scope for the environmental impact assessment (EIA). The SMR refers to the need for the EIA to consider any significant effects caused by activities such as HS2 services on the existing 'classic' railway network north of Birmingham.
- 2.1.3 To facilitate the HS2 services which will run on the WCML north to Liverpool, Manchester, Preston and Glasgow, there is a need to provide new railway infrastructure (e.g. signal gantries) and alter the track alignment north of Lichfield, where the Proposed Scheme joins the WCML. Trains running north to Liverpool, Manchester and Glasgow will require overnight servicing and stabling facilities at existing depots. The environmental effects of these works are considered in this report.
- 2.1.4 Changes in service provision on the WCML brought about by introduction of HS2 train services will also alter the passenger patronage at a number of stations both south and north of the Lichfield junction which may affect traffic volumes on local roads around the stations. Where the environmental effects of such changes are considered significant, they are assessed in this report.
- 2.1.5 Works for the Proposed Scheme at Old Oak Common will also affect existing train depots used by Heathrow Express and First Great Western. This report considers the environmental effects of relocating the train stabling and servicing requirements from the existing depots to new facilities at the nearby North Pole depot. Each element of the off-route assessment is considered in greater detail in turn in the following sections of this report:
- changes in passenger demand at off-route rail stations (see section 3);
 - works required at off-route rail depots (see section 4);
 - works to the WCML between Lichfield and Colwich (see section 5);
 - replacement of the Heathrow Express (HEX) depot (see section 6); and
 - replacement of the First Great Western (FGW) depot (see section 7).
- 2.1.6 Each of these activities, and the justification for including it within this assessment, is described within the relevant section of this report.

2.2 Assessment scope

Off-route rail station effects

EIA screening criteria

- 2.2.1 The identification of stations for assessment of off-route effects is based upon consideration of the SMR criteria for traffic and transport impacts, as well as air quality and sound, noise and vibration. The SMR criteria identify a 10% change in use (measured in this context in terms of station footfall) as a threshold for when impacts on transport infrastructure could become significant and when changes in traffic might affect pedestrian and cyclist severance. In addition, a criterion is necessary to identify potential effects on traffic congestion and delays, which needs to recognise the capacity of access routes. A minimum change in likely highway use of 5% has been adopted for this and this has been factored up to an equivalent daily change in rail passengers. If the station is served by a busy urban single carriageway road then a lower threshold of a change of 700 users per day is considered appropriate. A higher threshold of 1400 users per day has been used if higher capacity dual carriageway access is available. These thresholds assume a reasonable maximum percentage of passengers likely to arrive or depart by car/taxi and likely passenger arrival/departure times.
- 2.2.2 Further analysis would be required if the thresholds for severance (a 10% change in use) or congestion (5% of highway capacity, i.e. a change of 700 or 1400 users depending on the type of road) are exceeded. Below these thresholds, the potential impact on transport facilities, congestion, air quality, and sound, noise and vibration would be negligible.

Station screening criteria

- 2.2.3 Application of the thresholds set out above provided an initial sift to identify operational stations that could give rise to effects on other transport networks. The sift was based on the PLANET model¹ forecasts of changes in patronage at all stations across the UK. The 2041 assessment year forecast has been used as the basis of this assessment. Since the PLANET model provides only 2036 forecasts, these have been increased in line with expected trend growth to 2041. The sift identified that one or both of the threshold criteria were exceeded at the following stations, that are not otherwise considered in Volume 2:
- Northampton station;
 - Rugby station;
 - Wolverhampton station;
 - Stafford station;
 - Crewe station;
 - Wilmslow station; and

¹ The PLANET Framework Model (PFM) is a strategic transport model covering all long distance rail movements across England, Scotland and Wales.

- Runcorn station.

- 2.2.4 It should be noted that by initially applying the lower threshold of a change of 700 users per day Manchester Airport station was also identified. However, the station is served by a direct link to the M56 (and other direct highway access) and therefore the higher threshold of 1400 users per day is considered more appropriate and has been applied. The increase in the number of users per day does not exceed this higher threshold and therefore this station has not been the subject of further analysis.
- 2.2.5 For Wilmslow, it is expected that the forecast increase will include a proportion of passengers interchanging to other rail services to reach other local stations. It is expected that this will reduce the number of passengers leaving Wilmslow station to below the 700 users per day threshold. Consequently, Wilmslow station has also not been considered for further analysis.
- 2.2.6 For the remaining six stations a more detailed analysis has been undertaken, which is set out in Section 3.

Off-route rail depot effects

- 2.2.7 Some HS2 classic compatible trains will be stabled overnight at existing rail depots (remote from the route) off the WCML, north of Lichfield. These off-route depots will be required to accommodate the stabling, cleaning and servicing of some HS2 trains during operation of the Proposed Scheme.
- 2.2.8 Four existing depots are available for use at: Edge Hill in Liverpool, Longsight and Longsight International depots in Manchester, and Polmadie in Glasgow. Edge Hill, Longsight and Polmadie depots will be routinely used for the stabling, cleaning and light maintenance of HS2 trains, and Longsight International will be used as a satellite depot².
- 2.2.9 There is no requirement for additional land during construction or operation of the Proposed Scheme. Physical works are not required at Edge Hill, Longsight or Polmadie to accommodate the HS2 classic compatible train sets beyond the basic updating of facilities. The exception is the possibility of renewing the controlled emission toilets (CET)³ and carriage washing equipment to ensure compatibility with the new classic compatible trains.
- 2.2.10 The depots are existing facilities and all but one (Longsight International) are currently operational. The screening exercise identified Longsight International as the only location where changes, as a result of the Proposed Scheme, will be substantial enough to give rise to the potential for significant environmental effects. Section 4 of this report, therefore, focuses predominantly on the potential environmental effects at Longsight International depot.

² Staff working at the satellite depot would not be permanently based there and would be out-based from the main Longsight depot. Therefore, the resources at the satellite depot would fluctuate dependant on workload and demand.

³ Type of toilet used for the hygienic and safe disposal of toilet tank contents on railway carriages.

Modifications to the WCML between Lichfield and Colwich

- 2.2.11 A limited number of changes to the existing WCML infrastructure, and its connections to the Chase Line and North Staffordshire Line, will be required to facilitate the proposed connection with HS2 at Handsacre and to maintain operational flexibility on the WCML.
- 2.2.12 Whilst some of these works are within CFA22 (Whittington to Handsacre), and are addressed in Volume 2, other works fall within the definition of off-route works as they are mainly concerned with the operation of the WCML. Their environmental effects are addressed within Section 5 of this report.
- 2.2.13 The Proposed Scheme will require the following works on the WCML: the construction of new signalling equipment to control train movements; track alignment alterations; some additional crossovers to allow trains to switch tracks; some minor alterations to overhead line electrification to accommodate the track alterations; and the provision of ancillary lineside equipment associated with these works.
- 2.2.14 These works are included within the scope of the off-route assessment on modification to the WCML between Lichfield and Colwich on the basis that they may have potential to give rise to significant environmental effects.

Relocation of the Heathrow Express depot

- 2.2.15 The existing HEx depot is located in the Old Oak Common area and will be displaced by the Proposed Scheme. This will require an alternative site for HEx rolling stock to be stabled and maintained to enable services to continue to operate.
- 2.2.16 The favoured option is to provide a new depot facility for HEx rolling stock at the eastern end of the North Pole depot, which is currently unoccupied and was previously in use as a railway maintenance depot. This site ranked highest for accommodating and maintaining the HEx fleet after considering engineering, environmental, operational and cost implications but is subject to further operational modelling. The works are included within the scope of this assessment on the basis that they are a required mitigation measure for the Proposed Scheme, and they may have potential to give rise to significant environmental effects.

Relocation of the First Great Western depot

- 2.2.17 The existing FGW depot is located in the Old Oak Common area and will be displaced by the Proposed Scheme. This will require an alternative site for FGW rolling stock to be stabled and maintained to enable services to continue to operate.
- 2.2.18 The preferred option is to relocate the FGW fleet to the new Intercity Express Programme (IEP) depot⁴ that is being constructed on the currently disused North Pole site. The preferred option is included within the scope of this assessment on the basis that it is a required mitigation measure for the Proposed Scheme, and may have potential to give rise to significant environmental effects.

⁴ A Department for Transport programme to finance, build, construct facilities (depots) for, and maintain over a period of around 30 years a new set of high speed trains for the UK rail network.

2.3 Issues scoped out of the off-route assessment

- 2.3.1 A number of other issues and potential areas of work were considered but scoped out of the assessment. These are described in this section.

Construction and operational effects from consequential works to Network Rail infrastructure

- 2.3.2 It is likely that, in addition to the works between Lichfield and Colwich, there will be consequential works to Network Rail infrastructure as a result of the Proposed Scheme. Such works are expected to include works to achieve line speed improvements to the north of Colwich (including recanting of track and changing signage). This will allow an increase in the speed of classic compatible and other trains to that matching the existing Pendolino trains. It will not be necessary to seek development consent through the HS2 hybrid Bill, and the works are not judged to have potential for significant environmental effects. Therefore, they are not considered further in the ES.
- 2.3.3 There may be further works required to the classic rail network in future to accommodate growing demand for passenger and freight services together with HS2 services. In so far as those works involve further powers or give rise to significant adverse effects likely to require further application for consents or approval, they will require assessment at that stage.
- 2.3.4 Beyond Colwich the operational change in the number of trains on the existing lines caused by HS2 services is considered to be negligible in environmental terms.
- 2.3.5 South of Lichfield, the introduction of HS2 services will release capacity on the existing rail network. The new or improved services introduced in response to the capacity released during the daytime on the existing rail network are not likely to result in significant environmental effects. This is because parts of the existing network are likely to be at capacity when the Proposed Scheme comes in to service. The Proposed Scheme would not therefore result in any material increase in the number or speed of services.
- 2.3.6 HS2 will not operate between 2400 and 0500 and therefore will not release capacity during this period and hence the Proposed Scheme will not give rise to significant indirect adverse environmental effects at night along the existing rail network.
- 2.3.7 On this basis, construction and operational effects from consequential works to Network Rail infrastructure have been scoped out of the off-route assessment.

Utility diversions and works to National Grid infrastructure

- 2.3.8 The Proposed Scheme will affect existing utilities at various points. Where utility works have the potential to give rise to significant environmental effects they are considered in the relevant CFA reports in Volume 2. Therefore, they are not considered further in this report.

Waste and material resources

- 2.3.9 The construction of the Proposed Scheme will result in excavated material generated at cuttings, and through foundation construction, drainage excavation, and tunnelling

operations. The majority of this material will be re-used within the Proposed Scheme, primarily for engineering earthworks (i.e. railway and highway embankments) and environmental mitigation earthworks (i.e. visual screening and landscape integration). There will, however, be a surplus of excavated material route-wide across the Proposed Scheme and options for on-site placement and off-site disposal will be required. In addition, waste will be generated from demolition, construction and worker accommodation sites as well as the operation of the Proposed Scheme, which will require off-site disposal.

2.3.10 Volume 3, Section 14 of the ES provides a route-wide assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste that will be generated by construction and operation of the Proposed Scheme. The assessment considers:

- the types and overall quantity of waste that will be generated;
- the quantity of waste that will require off-site disposal to landfill; and
- the availability of landfill disposal capacity to manage waste requiring off-site disposal to landfill.

2.3.11 This report presents the assessment of waste and material resources generated specifically from the off-route works at a location specific level.

2.4 Construction of the Proposed Scheme

Construction programme and activities

2.4.1 An indicative construction programme for each CFA is provided within the CFA reports (Volume 2), and any off-route works will take place within this overall construction timescale. The programme refers to time frames and durations of key construction elements.

2.4.2 Key provisions of relevance to this assessment include the approach to environmental management during construction, which includes the measures within the draft Code of Construction Practice (CoCP) (see Volume 1, Section 6.3 and Volume 5: Appendix CT-003-000) relating to:

- working hours;
- the operation of construction compounds;
- the management of utilities diversions;
- the management of construction traffic; and
- the handling of construction materials.

3 Off-route rail stations

3.1 Introduction

3.1.1 This section reports the assessment undertaken for the six off-route rail stations where, due to an increase in passenger growth as a result of the Proposed Scheme, significant effects are possible. Section 2.2 of this report describes the screening approach used to identify these rail stations.

3.2 Methodology

Introduction

3.2.1 The assessment of off-route rail stations covers a reduced scope of traffic and transport, sound, noise and vibration, and air quality. The changes as a consequence of the Proposed Scheme relate solely to changes in passenger numbers at these stations, and no physical works are proposed. No other environmental topics were identified as having potential for significant environmental effects.

Traffic and transport assessment methodology

3.2.2 In terms of transport impacts the focus was on changes to the number of cars and taxis accessing the station as a result of the operation of the Proposed Scheme, as this has the potential to give rise to more significant environmental effects compared to bus use, walking and cycling. Existing commercial bus operators determine the frequency of bus services and would be expected to account for any changes in passenger demand when planning future services.

3.2.3 A two stage approach has been used to assess the operational impacts and consequential effects of the Proposed Scheme on the traffic and transport network local to off-route stations.

3.2.4 Stage 1 comprised the estimation of the vehicular trips that will be generated by the Proposed Scheme at each off-route station, and a comparison with the peak hour threshold trip generation of 75-95 or 150-190 vehicle movements respectively for single and dual carriageway standard roads. These figures convert 700 or 1400 station users/day in the initial sift criteria to peak hour vehicle thresholds. If the number of estimated trips generated by the Proposed Scheme was equal to or greater than these sift criteria, a second stage of analysis was undertaken to establish the potential impacts and effects on the local road network.

Stage 1

3.2.5 The following process was used to establish the trips generated by the operation of the Proposed Scheme at each off-route station:

- existing conditions at the off-route stations were established through site visits, specially commissioned traffic surveys and data from local authorities. Traffic surveys at the stations and on the local road networks were undertaken in 2013 comprising junction turning counts, automatic traffic counts, car park and drop off surveys;

- for the purpose of analysis, the highway peak hours were taken as 08:00-09:00 and 17:00-18:00;
- the existing vehicular trip generation at each off-route station was established from the traffic surveys, and the future baseline for the year of assessment, 2041, has been estimated by applying growth in line with the DfT's Trip End Model Presentation Program (TEMPRO)⁵; and
- the Proposed Scheme trip generation was estimated from the traffic survey data, TEMPRO growth forecasts and PLANET passenger demand forecasts of percentage growth in station use for the Proposed Scheme.

Stage 2

- 3.2.6 To establish the impacts and effects on the local road network at each off-route station a comparison of the future baseline and 'with the Proposed Scheme' traffic flows was carried out.
- 3.2.7 The 'with the Proposed Scheme' traffic flows were developed by assigning the Proposed Scheme's trip generation estimated in Stage 1 to the local road network and adding them to the future baseline traffic flows.

Sound, noise and vibration assessment methodology

- 3.2.8 The predicted traffic flows at each station have been examined to identify where changes exceed thresholds identified in assessment methodology⁶ consistent with the Design Manual for Roads and Bridges (DMRB)⁷ that can be used to identify where an assessment of noise is required. The main criteria adopted for this assessment are to examine where annual average weekday traffic (AAWT) flows increase by more than 20%. Roads have also been examined to identify where traffic flows increase by more than this threshold. Below this threshold adverse effects are negligible.
- 3.2.9 Where the threshold has been exceeded, the change in base noise levels⁸ has been calculated to establish whether an increase of 3dB or greater could occur at receptors along each road considered. A 3dB change would result in a minor long term adverse effect on residential receptors. Where a 3dB change or greater is identified then a qualitative assessment was undertaken to identify how many receptors could be affected, the grouping of the affected receptors, the magnitude of the adverse effects and local context.
- 3.2.10 The assessment has been carried out for the year 2026 using the predicted traffic flows for 2041. This is a reasonable worst case approach. Changes in car technology may offset some of the expected sound level increases due to traffic growth expected without the Proposed Scheme on low speed roads. On higher speed roads⁹, tyre sound dominates and hence the expected growth in traffic is likely to continue to increase ambient sound levels.

⁵ The forecasts of traffic growth were taken from the Department of Transport's National Trip End Model (NTEM) forecasts contained within the TEMPRO software package.

⁶ Further information is provided in Volume 5: Appendix SV-001-000.

⁷ Highways Agency (2011), *The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 7 Noise and Vibration HD213/11*.

⁸ Her Majesty's Stationery Office (1988), *Calculation of Road Traffic Noise*.

⁹ Tyre noise typically becomes the dominant sound source for steady road traffic at speeds above approximately 30mph.

Air quality assessment methodology

- 3.2.11 The predicted traffic flows at each station have been examined to identify where changes exceed thresholds suggested by Environmental Protection UK¹⁰ and in Volume 11 of the DMRB that can be used to identify where a detailed air quality assessment is required. The main criteria adopted for this assessment are to examine where annual average daily traffic (AADT) flows increase by more than 1,000 vehicles. Roads have also been examined to identify where traffic flows increase by more than 10%. Air quality impacts are only expected on roads where the AADT flows also exceed 10,000 (or 5,000 in very congested areas). Where these criteria have not been exceeded, it can be concluded that the air quality impacts will not be significant.
- 3.2.12 Where the criteria have been exceeded, a quantitative air quality assessment has been carried out using the DMRB screening methodology. Detailed air quality modelling would be undertaken if the DMRB screening method showed a risk of exceedance of air quality standards. This is consistent with the methodology used for the assessment of the air quality impacts along the route of the Proposed Scheme. The assessment has been carried out for the year 2026 using the predicted traffic flows for 2041. This is a reasonable worst case approach as pollutant concentrations are expected to decrease in future years as vehicle emissions standards improve.

3.3 Northampton station

Introduction

- 3.3.1 The use of released capacity provides potential for service improvements and reduced crowding for passengers at Northampton station, which is expected to result in increased passenger demand. It is forecast that by 2036, passenger demand at Northampton station will increase by 10% as a result of the Proposed Scheme (as compared to the future baseline), and by 2041 this figure will increase to 12%.

Environmental baseline

- 3.3.2 Northampton station is located approximately 800m west of the town centre. The station is bordered by the A5095 St. Andrew's Road to the east, and the A4500 Black Lion Hill to the south. The western boundary is marked by the River Nene and the northern boundary by a building material supplier.
- 3.3.3 Vehicular access to Northampton station is off the A5095 St. Andrew's Road and the A4500 Black Lion Hill, where there is a one way loop at the station frontage for taxis and drop off/pick up trips. The station car parks are accessed off the A5059 St. Andrew's Road and the A4500 Black Lion Hill. The A4500 Black Lion Hill connects to the A5095 St. Andrew's Road and the A4500 St. Peter's Way to the east.
- 3.3.4 A new station building to improve capacity is currently under construction to replace the existing station, and this will include closure of the Black Lion Hill access to traffic, and changes to the local road network to improve the accessibility of the St. Andrew's Road access. The new station is due to open in late 2014.

¹⁰ Environmental Protection UK, (2010), *Development Control: Planning for Air Quality*.

- 3.3.5 The car park and drop off surveys undertaken in July 2013 showed that there were 424 vehicle movements to/from the station in the morning peak hour, and 457 in the evening peak hour.
- 3.3.6 Future baseline traffic volumes are forecast to grow by around 24% by 2041 compared to 2013.
- 3.3.7 As a result, in the future baseline of 2041, it is estimated that the station will attract 526 vehicle movements in the morning peak hour, and 565 in the evening peak hour.

Overview of environmental effects

Traffic and transport

- 3.3.8 It is estimated that the Proposed Scheme will generate an additional 58 vehicular trips in the morning peak hour and an additional 63 trips in the evening peak hour at Northampton station. The peak hour trip generation is less than 90% of that considered to be significant in the sift criteria (75 to 95 trips for a single carriageway road), and as a consequence, the Proposed Scheme has not been identified as having a significant impact on the local road network.
- 3.3.9 There may be an increase in parking demand and use of drop-off facilities as a result of the increased passenger numbers using the station. The station owner/operator and the local highways authorities may need to give consideration as to any measures to control traffic and parking in the area. However, in the absence of clear plans to increase parking provision or otherwise manage parking, the increased pressure on parking and drop-off facilities has been assessed as having a minor adverse significant effect.

Sound, noise and vibration

- 3.3.10 The minimum change in annual average weekday traffic flows that would be likely to result in an adverse noise effect would be a 20% increase. The highest forecast change in traffic on roads around the station is around 9% which is below this threshold and is therefore not considered significant.

Air quality

- 3.3.11 For air quality, a minimum change of 1,000 vehicles a day has been set as the threshold in the SMR (Volume 5: Appendix CT-001-000/1), below which the effects will not be significant. In addition to this, a 10% change in flows has been used to identify further areas where significant effects might occur.
- 3.3.12 The largest predicted increase in traffic flows is on the Station Access Road where AADT flows will increase by up to 853 vehicles which is equivalent to a percentage increase of 7.2% over the baseline flow of 5,503 in 2041. Elsewhere, on roads around the station, the predicted increases in traffic flows are much lower. Consequently, the predicted changes in traffic are well below the threshold where a significant effect is likely and, therefore, any air quality impacts are not likely to be significant.

3.4 Rugby

Introduction

- 3.4.1 The use of released capacity provides potential for service improvements and reduced crowding for passengers at Rugby station, which is expected to result in increased passenger demand. It is forecast that by 2036, passenger demand at Rugby station will increase by 11% as a result of the Proposed Scheme (as compared to the future baseline), and by 2041 this figure will increase to 12%.

Environmental baseline

- 3.4.2 Rugby station is located on Railway Terrace approximately 1km northeast of the town centre. The station is bordered to the north by offices and warehousing and to the south by residential areas.
- 3.4.3 Vehicular access to Rugby station is off Railway Terrace, where there is a taxi/drop off and pick up facility on street. Railway Terrace connects with Mill Road and Murray Road to the east, and the B5414 Clifton Road to the south. Mill Road passes under the railway line where the road narrows to a single lane and connects with Butlers Leap to the north. Murray Road connects with the B5414 Clifton Road, Whitehall Road and Lower Hillmorton Road. The station has three car parks located on Railway Terrace, Murray Road and Mill Road.
- 3.4.4 To establish the existing station trip generation, traffic surveys were undertaken at the car park accesses on Railway Terrace, Murray Road and Mill Road, and at the drop off facility on Railway Terrace.
- 3.4.5 Future baseline traffic volumes are forecast to grow by approximately 20% by 2041 compared to 2013.

Overview of environmental effects

Traffic and transport

- 3.4.6 It is estimated that the Proposed Scheme will generate an additional 64 vehicular trips in the morning peak hour and an additional 64 trips in the evening peak hour at Rugby station. The peak hour trip generation is below that considered to be significant in the sift criteria (75 to 95 trips for a single carriageway road) and, as a consequence, the Proposed Scheme has not been identified as having a significant impact on the local road network.
- 3.4.7 There may be an increase in parking demand and use of drop-off facilities as a result of the increased passenger numbers using the station. The station owner/operator and the local highways authorities may need to give consideration as to any measures to control traffic and parking in the area. However, in the absence of clear plans to increase parking provision or otherwise manage parking, the increased pressure on parking and drop-off facilities has been assessed as having a minor adverse significant effect.

Sound, noise and vibration

- 3.4.8 The minimum change in annual average weekday traffic flows that would be likely to result in an adverse noise effect would be a 20% increase. The forecast change in

traffic on total station access trips will be no more than 12% and on roads around the station will be lower, which is below this threshold and is therefore not considered significant.

Air quality

- 3.4.9 For air quality, a minimum change of 1,000 vehicles a day has been set as the threshold in the SMR (Volume 5: Appendix CT-001-000/1), below which the impact will not be significant. In addition to this, a 10% change in flows has been used to identify further areas where significant effects might occur.
- 3.4.10 The predicted increases in flows at this station are well below the thresholds where a significant air quality impact could be expected. The largest increase in AADT flows is 292 vehicles at the junction of Murray Road, Mill Road and Railway Terrace, which is equivalent to a 1.7% change from the existing baseline flows. This is well below the level where a significant air quality effect would be expected and therefore the air quality impacts are not likely to be significant.

3.5 Wolverhampton station

Introduction

- 3.5.1 The use of released capacity provides the potential for service improvements and reduced crowding for passengers at Wolverhampton station, which is expected to result in increased passenger demand. It is forecast that by 2036, passenger demand at Wolverhampton station will increase by 13% as a result of the Proposed Scheme (as compared to the future baseline), and that by 2041 this figure will increase to 14%.

Environmental baseline

- 3.5.2 Wolverhampton station is located on Railway Drive around 400m east of the city centre. The station is bordered by the A4150 Ring Road to the west, and to the north, east and south by industrial and residential uses.
- 3.5.3 Vehicular access to the station is off Railway Drive, where there is a drop off facility and car parking. Railway Drive is a dedicated station access, which bridges the A4150 Ring Road before connecting with Fryer Street, Piper's Row and Lichfield Street. These roads serve commercial and leisure uses, and Piper's Row also serves Wolverhampton bus station and car parking. Fryer Street and Piper's Row provide access to the A4150 Ring Road via Broad Street and Bilston Street, and Lichfield Street connects to Princess Street.
- 3.5.4 The car park and drop off surveys undertaken in July 2013 showed that there were 609 vehicle movements to/from the station in the morning peak hour, and 510 in the evening peak hour.
- 3.5.5 Future baseline traffic volumes are forecast to grow by around 24% by 2041 compared to 2013.
- 3.5.6 As a result, in the future baseline of 2041, it is estimated that the station will attract 755 vehicle movements in the morning peak hour, and 631 in the evening peak hour.

Overview of environmental effects

Traffic and transport

- 3.5.7 It is estimated that the Proposed Scheme will generate an additional 105 trips in the morning peak hour and an additional 89 trips in the evening peak hour at Wolverhampton station. This peak hour trip generation exceeds the sift criteria of 75 to 95 trips for a single carriageway road in the morning and evening peak hour.
- 3.5.8 When the trips generated by the Proposed Scheme are considered in the context of the local road network, it is expected that there will be increases in peak hour traffic flows on the following road links where there will also be consequential minor adverse traffic severance¹¹ effects due to the flow increases of 11-15%:
- Railway Drive (dedicated station access); and
 - Fryer Street.
- 3.5.9 The effect on Fryer Street is in part due to the relatively low existing background traffic flows. The severance effect will be reduced as there are signal controlled pedestrian crossings on Railway Drive and Fryer Street, so opportunities for pedestrians to cross will be maintained.
- 3.5.10 The largest increases in traffic are on the roads closest to the station, which are relatively lightly trafficked in the peak hours, with traffic volumes well within the capacity of the links. As a consequence, the predicted increase in traffic is not expected to have a significant effect on congestion and delays.
- 3.5.11 There may be an increase in parking demand and use of drop-off facilities as a result of the increased passenger numbers using the station. The station owner/operator and the local highways authorities may need to give consideration as to any measures to control traffic and parking in the area. However, in the absence of clear plans to increase parking provision or otherwise manage parking, the increased pressure on parking and drop-off facilities has been assessed as having a minor adverse significant effect.

Sound, noise and vibration

- 3.5.12 The minimum change in AAWT flows that would be likely to result in an adverse noise effect would be a 20% increase. The highest forecast change in traffic on roads around the station is around 14% which is below this threshold and is therefore not considered significant.

Air quality

- 3.5.13 For air quality, a minimum change of 1,000 vehicles a day has been set as the threshold in the SMR (Volume 5: Appendix CT-001-000/1), below which the impact would not be significant. In addition to this, a 10% change in flows has been used to identify further areas where significant effects might occur.

¹¹ In the context of the traffic and transport assessment, the term 'severance' is used to relate to a change in ease of access for non-motorised users due to, for example, a change in travel distance or travel time or a change in traffic levels on a route that makes it harder for non-motorised users to cross. A reference to severance does not imply that a route is closed to access.

- 3.5.14 Railway Drive, which is the approach road to the station, exceeds the threshold with an increase of 1,316 vehicles equating to a percentage increase of 14.3%. However, this is for a short stretch of road and the traffic is predicted to rapidly disperse at the junction with Fryer Street, Lichfield Street and Piper's Row. The increases in AADT on these roads are predicted to be between 264 and 593 vehicles. Baseline flows on these roads are between 4,578 and 5,469. Elsewhere, the predicted changes in traffic flows do not exceed the threshold criteria for a significant air quality impact to be expected.
- 3.5.15 To assess the air quality impacts near to Railway Drive, the predicted NO₂ concentrations with and without the Proposed Scheme have been calculated using the DMRB screening method. Two receptors have been selected, the Prince Albert public house on the corner of Railway Drive and Fryer Street, and a receptor on the empty development site on Railway Drive opposite the Prince Albert public house. The results of the DMRB assessment are shown in Table 1.

Table 1: Results of DMRB assessment at Wolverhampton station

Receptor	NO ₂ concentrations (µg/m ³)		Change in NO ₂ concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2041 without Proposed Scheme	2041 with Proposed Scheme			
Prince Albert public house	30.7	31.1	0.4	Small	Negligible
Development site	31.2	31.7	0.4	Small	Negligible

- 3.5.16 The results of the assessment show that annual mean NO₂ concentrations are forecast to be below the air quality standard of 40µg/m³, both with and without the operation of the Proposed Scheme. The change in concentrations is small at both modelled receptors, and the overall impact is expected to be negligible, thus the effects are not significant.

3.6 Stafford station

Introduction

- 3.6.1 The Proposed Scheme is planned to have trains stopping at Stafford station, which is expected to result in increased passenger demand. It is forecast that by 2036, passenger demand at Stafford station will increase by 15% as a result of the Proposed Scheme (as compared to the future baseline), and that by 2041 this figure will increase to 16%.

Environmental baseline

- 3.6.2 Stafford station is located on Station Road/Railway Street around 500m southwest of the town centre. Victoria Park and commercial premises are located immediately to the east of the station. The area to the north is largely commercial, and to the south east there is a mix of retail and residential uses. The area to the west/south-west is largely residential.
- 3.6.3 Vehicular access to Stafford station is off Station Road and Railway Street. Access to the drop off facility is off Railway Street. The main station car park is accessed off Station Road with a second smaller car park on Railway Street. Station Road is a local distributor, which connects with the A518 Newport Road and Victoria Road.

- 3.6.4 The car park and drop off surveys undertaken in July 2013 showed that there were 298 vehicle movements to/from the station in the morning peak hour, and 298 in the evening peak hour.
- 3.6.5 Future baseline traffic volumes are forecast to grow by around 11% by 2041 compared to 2013.
- 3.6.6 As a result, in the future baseline of 2041, it is estimated that the station will attract 332 vehicle movements in the morning peak hour, and 332 in the evening peak hour.

Overview of environmental effects

Traffic and transport

- 3.6.7 It is estimated that the Proposed Scheme will generate an additional 52 vehicular trips in the morning peak hour and an additional 52 trips in the evening peak hour at Stafford station. The peak hour trip generation is only 70% of that considered to be significant in the sift criteria (75 to 95 trips for a single carriageway road) and, as a consequence, the Proposed Scheme has not been identified as having a significant impact on the local road network.
- 3.6.8 There may be an increase in parking demand and use of drop-off facilities as a result of the increased passenger numbers using the station. The station owner/operator and the local highways authorities may need to give consideration as to any measures to control traffic and parking in the area. However, in the absence of clear plans to increase parking provision or otherwise manage parking, the increased pressure on parking and drop-off facilities has been assessed as having a minor adverse significant effect.

Sound, noise and vibration

- 3.6.9 The minimum change in annual average weekday traffic flows that would be likely to result in an adverse noise effect would be a 20% increase. The highest forecast change in traffic on roads around the station is around 2% which is below this threshold and is therefore not considered significant.

Air quality

- 3.6.10 For air quality, a minimum change of 1,000 vehicles a day has been set as the threshold in the SMR (Volume 5: Appendix CT-001-000/1), below which the impact will not be significant. In addition to this, a 10% change in flows has been used to identify further areas where significant effects might occur.
- 3.6.11 The predicted increases in flows at this station are well below the thresholds where a significant air quality impact could be expected. The largest increase in AADT flows is 361, which is equivalent to a 1.9% change from the existing baseline flows. This is well below the level where a significant air quality effect would be expected and therefore the air quality impacts are not likely to be significant.

3.7 Crewe station

Introduction

- 3.7.1 The Proposed Scheme is planned to have trains stopping at Crewe station, which is expected to result in increased passenger demand. It is forecast that by 2036, passenger demand at Crewe station will increase by 12% as a result of the Proposed Scheme (as compared to the future baseline), and that by 2041 this figure will increase to 13%.

Environmental baseline

- 3.7.2 Crewe station is located on Nantwich Road around 1km southeast of the town centre. The station is bordered to the west by rail infrastructure, offices, and the Alexandra Stadium, and beyond are residential areas. To the east, there are industrial and retail units.
- 3.7.3 Vehicular access to Crewe station is off the A534 Nantwich Road, where there is a taxi and drop off/pick up facility. The station car parks are accessed off Pedley Street. Nantwich Road is a local distributor, which to the west connects with the A5019 Mill Street, and to the east, the A532 Weston Road.
- 3.7.4 The car park and drop off surveys undertaken in July 2013 showed that there were 198 vehicle movements to/from the station in the morning peak hour, and 194 in the evening peak hour.
- 3.7.5 Future baseline traffic volumes are forecast to grow by around 15% by 2041 compared to 2013.
- 3.7.6 As a result, in the future baseline of 2041, it is estimated that the station will attract 227 vehicle movements in the morning peak hour, and 222 in the evening peak hour.

Overview of environmental effects

Traffic and transport

- 3.7.7 It is estimated that the Proposed Scheme will generate an additional 30 vehicular trips in the morning peak hour and an additional 30 trips in the evening peak hour at Crewe station. The peak hour trip generation is only 40% of that considered to be significant in the sift criteria (75 to 95 trips for a single carriageway road) and, as a consequence, the Proposed Scheme will not have a significant impact on the local road network.
- 3.7.8 There may be an increase in parking demand and use of drop-off facilities as a result of the increased passenger numbers using the station. The station owner/operator and the local highways authorities may need to give consideration as to any measures to control traffic and parking in the area. However, in the absence of clear plans to increase parking provision or otherwise manage parking, the increased pressure on parking and drop-off facilities has been assessed as having a minor adverse significant effect.

Sound, noise and vibration

- 3.7.9 The minimum change in annual average weekday traffic flows that would be likely to result in an adverse noise effect would be a 20% increase. The highest forecast change

in traffic on roads around the station is around 7% which is below this threshold and is therefore not considered significant.

Air quality

- 3.7.10 For air quality, a minimum change of 1,000 vehicles a day has been set as the threshold in the SMR (Volume 5: Appendix CT-001-000/1), below which the impact will not be significant. In addition to this, a 10% change in flows has been used to identify further areas where significant effects might occur.
- 3.7.11 The maximum increase in AADT flows is 223 vehicles at the junction of Pedley Street, Gresty Road and Nantwich Road in 2041. The largest percentage increase in traffic flows is on Pedley Street (west) where a 6.6% increase is predicted compared to the future baseline flows. However, the baseline (i.e. without the Proposed Scheme in 2041) flows on this road are only 1,950. The predicted flows and the level of change expected are well below the level where a significant air quality effect could be expected and therefore the impacts are not likely to be significant.

3.8 Runcorn station

Introduction

- 3.8.1 The Proposed Scheme is planned to have trains stopping at Runcorn station, which is expected to result in increased passenger demand. It is forecast that by 2036, passenger demand at Runcorn station will increase by 36% as a result of the Proposed Scheme (as compared to the future baseline) and that by 2041, this figure will increase to 40%.

Environmental baseline

- 3.8.2 Runcorn station is located on Shaw Street approximately 600m southwest of the town centre. The station is bordered to the north by the A557 Weston Point Expressway, and to the east by the elevated A533 Queensway. The area from the southwest to the southeast of the station is predominantly residential.
- 3.8.3 Vehicular access to the station is off Shaw Street which connects to the B5155 Greenway Road and via Cavendish Street, the A533 Queensway and Picow Farm Road. Shaw Street is predominantly residential to the south of the station. Cavendish Street passes under the A533 Queensway before passing commercial/office premises, all of which are located within a loop formed by the Queensway slip roads. Picow Farm Road provides access to industrial premises to the north, and residential areas to the south.
- 3.8.4 There is a turning circle outside the station entrance, with a holding area for taxis, and a drop off facility. The station has three car parks, including two on Shaw Street and one on Holloway, which connects with Picow Farm Road.
- 3.8.5 The car park and drop off surveys showed that there were 143 vehicle movements to/from the station in the morning peak hour, and 189 in the evening peak hour.
- 3.8.6 Future baseline traffic volumes are forecast to grow by approximately 22% by 2041 compared to 2013.

- 3.8.7 As a result, in the future baseline of 2041, it is estimated that the station will attract 176 vehicle movements in the morning peak hour, and 231 in the evening peak hour.

Overview of environmental effects

Traffic and transport

- 3.8.8 It is estimated that the Proposed Scheme will generate an additional 67 trips in the morning peak hour and an additional 89 trips in the evening peak hour at Runcorn station. The peak hour trip generation exceeds the sift criteria of 75 to 95 trips for a single carriageway road in the evening peak hour.
- 3.8.9 When the trips generated by the Proposed Scheme are considered in the context of the local road network, it is expected that there will be increases in peak hour traffic flows on roads around the station. This will be 40% on the dedicated station access (Shaw Street, north of Cavendish Street) and between 12-27% on the rest of Shaw Street and Cavendish Street.
- 3.8.10 These changes are in part due to the relatively low background traffic flows and related small changes in traffic (just over one vehicle per minute). Consequently, although these are minor adverse severance effects, opportunities for pedestrians to cross will be maintained.
- 3.8.11 The largest increases in traffic as a result of the Proposed Scheme are on the roads closest to the station, as would be expected. The roads around the station are relatively lightly trafficked in the peak hours with traffic volumes well within the capacity of the links. As a consequence, the predicted increase in traffic is not expected to have a significant effect on congestion and delays.
- 3.8.12 There may be an increase in parking demand and use of drop-off facilities as a result of the increased passenger numbers using the station. The station owner/operator and the local highways authorities may need to give consideration as to any measures to control traffic and parking in the area. However, in the absence of clear plans to increase parking provision or otherwise manage parking, the increased pressure on parking and drop-off facilities has been assessed as having a minor adverse significant effect.

Sound, noise and vibration

- 3.8.13 The minimum change in annual average weekday traffic flows that would be likely to result in an adverse noise effect would be a 20% increase. The forecast change is above this threshold on the following roads:
- Shaw Street (dedicated station access, north of Cavendish Street): 40% in the morning peak hour and 40% in the evening peak hour; and
 - Cavendish Street (between Lowlands Road and Shaw Street): 27% in the morning peak hour.
- 3.8.14 The change in base noise levels has been calculated for these roads, with the highest increase being 1.5dB on Shaw Street. This will be a minor adverse effect on residents along this road in the short term reducing to a negligible adverse effect in the long term. This effect is not considered to be significant.

Air quality

- 3.8.15 For air quality, a minimum change of 1,000 vehicles a day has been set as the threshold in the SMR (Volume 5: Appendix CT-001-000/1), below which the impact would not be significant. In addition to this, a 10% change in flows has been used to identify further areas where significant effects might occur.
- 3.8.16 The highest increase in flows (and the greatest percentage increase) is predicted on Shaw Street (north of Cavendish Street), with an increase in AADT of 702 vehicles and percentage increase of 40.7% in 2041. This short section of road is the main approach to the station but has no sensitive receptors nearby. As the forecast 2041 daily flows with the Proposed Scheme will be 2,427 this is well below the minimum flow that would be expected to lead to significant air quality effects.

3.9 Assessment of impacts and effects

Traffic and transport

- 3.9.1 Runcorn and Wolverhampton stations will experience increases in daily passenger numbers that will lead to increased traffic flows on roads close to the stations, and a minor adverse effect on non-motorised users, in that it will make it slightly harder for them to cross some roads. Increased passenger numbers and associated traffic will not have a significant effect on the local road network around the stations at Northampton, Rugby, Stafford and Crewe.
- 3.9.2 The forecast increase in daily passengers may increase pressure on car parking and drop-off facilities at Northampton, Rugby, Wolverhampton, Stafford, Crewe and Runcorn, resulting in a minor adverse effect.

Sound, noise and vibration

- 3.9.3 The noise effects resulting from the forecast increase in daily passenger numbers and associated traffic increases are not likely to be significant.

Air quality

- 3.9.4 The air quality effects resulting from the forecast increase in daily passenger numbers and associated traffic increases are not likely to be significant.

3.10 Other mitigation measures

- 3.10.1 No mitigation measures for the operation of the Proposed Scheme are considered necessary based on the results of this assessment.

3.11 Summary of likely significant residual effects

- 3.11.1 Increased traffic flows on roads close to Runcorn and Wolverhampton stations will make it slightly harder for non-motorised users to cross some of these roads. These effects have been assessed as being of minor adverse significance.
- 3.11.2 The forecast increase in daily passengers may increase pressure on car parking and drop-off facilities at Northampton, Rugby, Wolverhampton, Stafford, Crewe and Runcorn stations, leading to significant effects in these areas.

4 Off-route rail depots

4.1 Introduction

- 4.1.1 During the operational phase of the Proposed Scheme, HS2 classic compatible trains will run on the high speed network before joining the conventional northbound rail or 'classic' WCML network north of Handsacre, near Lichfield.
- 4.1.2 Trains will terminate at three stations on the classic network in Liverpool, Manchester and Glasgow.
- 4.1.3 The rolling stock maintenance and stabling depot for the Proposed Scheme, where the majority of rolling stock will be stabled overnight, will be at Washwood Heath near Birmingham. The effects of which are reported in Volume 2, CFA report 26, Washwood Heath to Curzon Street (CFA26).
- 4.1.4 However, as it is not practicable to move all trains from the terminating stations on the classic network to Washwood Heath at the end of the day and back again in the morning, off-route depots are required near Liverpool, Manchester and Glasgow.
- 4.1.5 The use of off-route depots will minimise the movement of empty HS2 trains, which will avoid stabling in terminus stations overnight. London Euston is the only terminus station where some overnight stabling of trains is planned.
- 4.1.6 A number of potential rail depot options were considered that are accessible to the Liverpool, Manchester and Glasgow HS2 terminating stations.
- 4.1.7 Four existing depots were identified as being available for the off-route stabling of HS2 trains, which are shown in Figure 1 (Section 1):
- Edge Hill depot in Liverpool, which is owned by Network Rail and currently operated by Alstom;
 - Longsight depot in Manchester, which is owned by Network Rail and currently operated by Alstom;
 - Longsight International depot in Manchester, which is owned by London & Continental Railways, which lies adjacent to the main Longsight depot and is not currently operational; and
 - Polmadie depot in Glasgow, which is owned by Network Rail and currently operated by Alstom.
- 4.1.8 The trains currently serving the HS2 destinations are Class 390 Pendolino trains which use Edge Hill, Longsight and Polmadie depots for overnight stabling. HS2 will be introducing HS2 classic compatible trains during Phase One.
- 4.1.9 The introduction of HS2 services will trigger an overall reduction in the number of Pendolino trains that serve the same destinations. For every HS2 classic compatible train that is in service a Pendolino train is likely to be withdrawn. However, a number of Pendlinos will still be in use across the network and due to differences in service

patterns between the current service and the HS2 service, this may not fully equate to a one for one replacement at each depot.

- 4.1.10 It is expected that 21 HS2 classic compatible trains will require off-route stabling during Phase One operations. Alternative stabling arrangements will be made for trains after 2033 when Phase Two is due to come into operation and these depots may no longer be required.
- 4.1.11 The off-route depots will be used for the overnight stabling, cleaning and light maintenance of HS2 classic compatible trains, which during Phase One will be zoom long.
- 4.1.12 Edge Hill, Longsight and Polmadie depots will be routinely used for the stabling, cleaning and light maintenance of HS2 trains, and Longsight International will be used as a satellite depot for Longsight.
- 4.1.13 Light maintenance includes activities such as the inspection of units, cleaning, re-stocking of consumables, and watering and emptying of CET. These activities will take place outside of the usual operating hours of the HS2 train service and will include work during the night and at weekends. The stabling, cleaning and light maintenance activities that are undertaken at train depots require trains to be moved around the depots during these periods to allow the efficient use of fixed equipment and facilities.
- 4.1.14 The remainder of this section reports the likely impacts and any significant environmental effects which are predicted from the use of each of these depots for Phase One.

4.2 Edge Hill depot, Liverpool

Introduction

- 4.2.1 Edge Hill depot is an existing facility lying approximately 3km south-east from Liverpool city centre, see Figure 2.

Figure 2: Location of Edge Hill depot



Existing land use

- 4.2.2 Currently the depot is used for the stabling of up to seven 260m long Pendolino trains each night. Six Pendolino trains are returned to Edge Hill on most nights, with one additional train returning typically twice a week. The depot is used for the servicing of the trains including the emptying and filling of tanks and exterior and interior cleaning.
- 4.2.3 The depot has 10 external rail sidings, eight of which are capable of accommodating 200m classic compatible trains. It also has external automatic carriage washing equipment.

- 4.2.4 The maintenance shed is capable of accommodating two 260m Pendolino trains for maintenance and stabling. Rail access to the depot is available from the London to Liverpool mainline railway.

Proposed works

- 4.2.5 A series of basic renewal works will be required to update equipment at the depot to ensure alignment and compatibility for servicing HS2 trains including the updating of CET facilities. Other works required may include updating track lighting, signalling, and overhead line equipment.
- 4.2.6 There are no land requirements and no new buildings are proposed.

Proposed operational activities

- 4.2.7 During Phase One, the depot will be used for nine HS2 classic compatible trains and Pendolino trains will no longer be stabled here. Seven of these trains will be stabled on the external rail sidings and two within the maintenance sheds.

Overview of likely environmental effects

- 4.2.8 Edge Hill depot is already fully operational, there are no additional land requirements and no significant physical works are proposed.
- 4.2.9 During most nights the existing operations involve seven or more trains, across 10 sidings, using the depot and maintenance shed for stabling, cleaning and maintenance. The existing depot creates noise, visual and air quality impacts which are managed in line with Network Rail operating guidelines. However, there are no residential receptors within immediate proximity.
- 4.2.10 While HS2 use will increase the number of trains stabled at Edge Hill by two, the depot has capacity for these extra trains and two of the additional trains will be stabled within the sheds.
- 4.2.11 Within this context the use of the depot for the overnight stabling of nine HS2 classic compatible trains is not likely to create any significant environmental effects.

4.3 Longsight depot, Manchester

Introduction

- 4.3.1 Longsight depot is an existing depot approximately 2.5km south-east of Manchester city centre (see Figure 3). It lies to the east of the London to Manchester mainline railway and the Longsight International depot.

Figure 3: Location of Longsight and Longsight International depots



Existing land use

- 4.3.2 Longsight depot is currently used for the stabling of up to 14 Pendolino trains and rolling stock for a number of other operators each night.
- 4.3.3 The site is also used for heavy and light maintenance and the servicing of trains including the emptying and filling of tanks and exterior and interior cleaning. External cleaning is carried out by two automatic carriage washing machines.
- 4.3.4 The depot includes external rail sidings which are capable of accommodating either Pendolinos or the zoom long HS2 classic compatible trains.

- 4.3.5 The maintenance facility is capable of accommodating 260m long trains.
- 4.3.6 Main rail access to the depot is via Manchester Piccadilly station from the north. There is a secondary access point to the south side of the depot.

Proposed works

- 4.3.7 A series of basic renewal works will be required to update equipment at the depot to ensure alignment and compatibility for stabling and servicing HS2 classic compatible trains including updating CET facilities. Other works required might include the updating of track lighting, signalling, and overhead line equipment.
- 4.3.8 There are no land requirements and no new buildings proposed.

Proposed operational activities

- 4.3.9 During Phase One the Longsight depot will be used for eight HS2 classic compatible trains and four Pendolinos.

Overview of likely environmental effects

- 4.3.10 Longsight depot is already fully operational; there are no additional land requirements and no significant physical works are proposed.
- 4.3.11 Existing operations involve more than 14 trains using the depot for stabling, cleaning and maintenance each night. The existing depot creates noise, visual and air quality impacts which are managed in line with Network Rail operating guidelines. However, there are no residential receptors within immediate proximity.
- 4.3.12 Within this context the use of the depot for the overnight stabling of eight HS2 classic compatible trains is not likely to give rise to any significant environmental effects.

4.4 Longsight International depot, Manchester

Introduction

- 4.4.1 Longsight International depot is an existing but unused train maintenance facility approximately 2.5km south-east of Manchester city, see Figure 3. The depot mainly consists of a large maintenance shed with two external rail sidings.
- 4.4.2 The depot lies to the west of the main Longsight depot but is separated from it by the London to Manchester mainline. It also lies adjacent to New Bank Street which is primarily a residential street, as shown in Figure 4.

Figure 4: Residential properties on New Bank Street



Existing land use

- 4.4.3 Longsight International depot was built in the early 1990s. The depot's most recent use was in 2005.
- 4.4.4 The maintenance shed incorporates two rail sidings each of approximately 325m in length. Both rail sidings have full length inspections pits and high level working platforms for access to roof equipment. There are CET facilities fitted along both inside walls of the shed and a CET pump house adjacent to the shed on the west side. The south end of the shed is occupied by a staff accommodation block.
- 4.4.5 Rail access to the depot is available from the north and road access is via a gate to the south of the main shed from New Bank Street.

Proposed works

- 4.4.6 A series of basic refurbishment works will be required to convert the currently unused shed into a safe working environment, including making the building watertight, upgrading facilities, utilities, and lighting. Equipment will also need to be repositioned and installed to enable the servicing of HS2 rolling stock.
- 4.4.7 The two existing rail sidings in the disused shed will be reinstated to berth one train on each siding. In addition the external tracks used for the ingress and egress of trains will also be checked, tested and upgraded if required, including possibly updating track lighting, signalling, and overhead line equipment.
- 4.4.8 These works will take less than six months to complete.

- 4.4.9 All works are associated with renovating the existing buildings and facilities and no new buildings are proposed.

Proposed operational activities

- 4.4.10 Longsight International will be used as a satellite depot for the stabling, cleaning and maintenance of HS2 classic compatible trains. It can accommodate two HS2 classic compatible trains.

Overview of likely environmental effects

- 4.4.11 Given that the depot has been used in only a very limited manner since its construction and that a more comprehensive set of refurbishment works are required at this location, it was considered appropriate to assess potential environmental impacts associated with use of this site. The following paragraphs set out the likely environmental impacts and effects that are anticipated with the re-use of this depot.

Agriculture, forestry and soils

- 4.4.12 The site is in an urban area and is an existing depot. No additional land is required and no significant earthworks are proposed. No impacts on agriculture, forestry or soils are anticipated.

Air quality

- 4.4.13 While the depot is currently unused, it lies adjacent to the main operational Longsight depot and an operational main line railway.
- 4.4.14 Within the vicinity, two companies operate under an Integrated Pollution Prevention and Control licence; these comprise a waste treatment centre and a waste transfer centre.
- 4.4.15 Construction works will be limited and will not involve large volumes of road traffic, and therefore effects on air quality during the construction phase will not be significant.
- 4.4.16 Operational activities will not give rise to significant effects.

Community

- 4.4.17 Given the location adjacent to the existing depot, no adverse community effects are anticipated during construction or operation.

Cultural heritage

- 4.4.18 There are no designated or non-designated heritage assets within the depot site. No new land is required nor will construction occur on undisturbed ground. The existing facilities are not of historic interest. There will be no impact on heritage assets.

Ecology

- 4.4.19 The maintenance shed is currently unused and its basic structure comprises a brick cavity wall and steel frame work with aluminium panelling.
- 4.4.20 An extended Phase One habitat survey was undertaken to provide field data for a preliminary ecological appraisal.

- 4.4.21 The site overall is not covered by any local, national or international ecological designations and no habitat of note was recorded in the depot compound or in the immediate surrounding area.
- 4.4.22 There was evidence of birds nesting in the shed and as the building provides a stable internal environment some bat potential exists at the site.
- 4.4.23 Dawn and dusk bat surveys were undertaken to ascertain the presence or otherwise of bats.
- 4.4.24 In general the building provides no points of entry for bats, with the exception of two 1m square openings at the north-west entrance. These openings allow overhead cables to pass through the main doors when these are closed (see Figure 5).

Figure 5: North-west entrance of Longsight International depot



- 4.4.25 These points of entry into the building were observed during the surveys. No bats were seen or heard emerging or entering the building during the surveys and no bats were seen commuting or foraging in the immediate area. Foraging habitat for bats in the immediate surrounding area is limited. No evidence of bat presence in the form of droppings or staining was found at the site. Sound analysis was performed using BatSound¹² software which confirmed these survey findings.
- 4.4.26 While the temperature in the shed is likely to be fairly stable, potential for winter hibernation or maternity roosting is considered low due to the structure of the

¹² Specialised software used to analyse bat calls.

building, construction materials used and its proximity to unfavourable habitat. There may be some potential for use as a temporary roost or feeding perch but the presence of power lines, floodlighting and the noise and disturbance from moving trains may also deter bat activity.

- 4.4.27 No bats were recorded during the survey and it has been concluded that the potential for bats to use the building is low.
- 4.4.28 All construction works will be undertaken in line with the measures set out in the draft CoCP (Volume 5: Appendix CT-003-000) and although no bats are present, there is a low potential for bat use. As a precautionary measure, pre-construction checks will ascertain if bats are using the building at the time of construction. If present, mitigation measures will be implemented in line with the relevant regulations. No significant impacts or effects on ecology are anticipated during construction.
- 4.4.29 Bats are unlikely to use the building during operation due to train noise, general activity and floodlighting at night. No significant impacts or effects on ecology are therefore considered likely during operation.

Land quality

- 4.4.30 As the site lies adjacent to an operational railway and depot and has been used for a brief period as a depot there is potential for contaminated material to be encountered and mobilised during the refurbishment works, depending on the extent of the works. However, intrusive earthworks are unlikely to be required.
- 4.4.31 Prior to construction the depot will be checked for asbestos and other harmful, hazardous or potentially contaminating substances. Construction works will be undertaken in accordance with the requirements of the CoCP. No significant construction impacts on land quality are anticipated.
- 4.4.32 The depot will be refurbished to industry standards for dealing with waste and potentially contaminating run-off during operation. No significant operational impacts on land quality are anticipated.

Landscape and visual assessment

- 4.4.33 Longsight International depot lies in an urban location which includes a mixture of residential, transport related and commercial uses. The depot abuts the London to Liverpool mainline railway and lies to the west of the main operational Longsight depot.
- 4.4.34 Given the location and context of the depot the upgrade and renovation works will not create any significant landscape impacts during construction or operation.
- 4.4.35 Longsight International depot is visible from the surrounding area including residential properties and roads immediately to the west of the site, namely New Bank Street, Lamb Close, Britnall Avenue and Martindale Crescent. The shed is visible at close proximity from these receptors and largely obstructs views beyond due to its height. The facility is also visible in the background of views from residential and transport receptors to the north-east adjacent to Hyde Road and to the south-east adjacent to Kirkmanshulme Lane. Residential receptors have a high sensitivity to change and road receptors have a low sensitivity to change.

- 4.4.36 During construction, impacts on the surrounding visual receptors will arise from the presence of machinery and operations associated with the upgrading of the depot shed including lighting. Impacts will arise from the construction works outside the depot shed including rail track adjustments and upgrades to track lighting, signalling and overhead line equipment. However, given the current high levels of activity from the existing railway and operational depot, additional movement and visual impacts from the limited construction activity proposed will cause a low magnitude of change. The low magnitude of change, assessed alongside the high sensitivity of the residential receptor, will result in a minor adverse effect during the construction period which is not significant.
- 4.4.37 Operational activities will be housed predominantly within the refurbished shed. Overall, impacts on the surrounding visual receptors will be derived mostly from the ingress and egress of trains at the northern end of the depot and increased traffic associated with arriving and departing vehicles to the south of the building. This will be visible within the existing urban context which currently features regularly passing trains and road vehicles. Therefore, the operational use of the depot will result in a negligible magnitude of change. The negligible magnitude of change, assessed alongside the high sensitivity of the residential receptor, will result in a negligible effect which is not significant.
- 4.4.38 At night-time some light spill from existing windows and open doors at the northern and southern ends of the shed and from a series of windows running along the eastern side of the depot building may be apparent. This will occur within the context of an urban landscape containing existing flood lighting associated with the main operational rail depot and existing security lighting around the depot building itself. Therefore, at night the magnitude of change will be negligible, resulting in a negligible effect which is not significant.

Socio-economics

- 4.4.39 The upgrade, reinstatement and operation of Longsight International depot may create a small number of additional jobs. However, while beneficial, this will not be a significant effect.

Sound, noise and vibration

- 4.4.40 The site lies adjacent to a street of residential properties which are around 50m to the west and face onto the flank of the main shed. The existing acoustic character of the area is typical of an urban location including sound from distant road traffic as well as sound events both day and night from local road traffic, trains and community activity.
- 4.4.41 Given the context of the adjacent existing operational depot and railway it is not anticipated that significant sound, noise or vibration impacts will occur during construction. The works planned are not extensive and will be temporary. All works will be carried out in accordance with the CoCP to minimise any impacts as far as reasonably practicable.

- 4.4.42 Due to the location of residential properties to the west and given that the use of the depot may introduce new potential noise sources closer to these properties; an on-site noise assessment for the operational phase was undertaken.
- 4.4.43 Baseline sound levels were recorded near to the properties on New Bank Street that are the closest residential receptors to the existing depot. These measurements indicated the existing ambient sound levels to be around 51dB LpAeq 07:00-23:00 during the day and 43dB LpAeq 23:00-07:00 during the night.
- 4.4.44 The operation of Longsight International depot as part of HS2 will generate sound at this location from the occasional stabling of HS2 trains. Trains will enter and leave the depot facility one at a time moving along the existing track. Since the depot has only two tracks it will not be possible for more than two HS2 trains to be on the site at any one time. The depot includes an existing shed. Once inside the shed HS2 trains will be cleaned, inspected and subject to light maintenance. People living on New Bank Street will be shielded from any sound generated during these activities by the building.
- 4.4.45 The assessment methodology that was used is the same as that used for the main rolling stock maintenance depot at Washwood Heath and detailed in CFA report 26 and in Volume 5: Appendix SV-001-000.
- 4.4.46 It is unlikely there will be more than two train movements into or out of the depot building within any one hour period, with no more than a total of 10 train movements during the day and six at night. Therefore, in the long term, the noise assessment has considered as a reasonable worst case a total of 10 train movements during the day and six train movements during the night.
- 4.4.47 The long term operational sound levels due to HS2 at the properties on New Bank Street are predicted to be no more than 41dB LpAeq 07:00-23:00 and 42dB LpAeq 23:00-07:00. This produces a combined operational sound level of 52dB LpAeq 07:00-23:00 and 45dB LpAeq 23:00-07:00.
- 4.4.48 The operation of the depot for HS2 is therefore predicted to increase the equivalent continuous sound levels by no more 1dB during the day and 2dB at night at the nearest residential properties. This is considered a negligible impact. Whilst the HS2 train movements will be audible at these properties, the existing acoustic character of the area is typical for an urban location and already features regular but variable sound events both day and night from local road traffic, trains and community activity as well as continuous sound from distant road traffic.
- 4.4.49 The effect of noise from the operation of HS2 trains at Longsight International depot is therefore considered not to be significant.

Traffic and transport

- 4.4.50 The construction and operation of this site will require staff, materials and waste to be transported to and from the site. Road access to the depot is via a chain link gate to the south-west of the site adjacent to the shed.
- 4.4.51 The renovation works required are not extensive and will not require the delivery of large amounts of building materials, abnormal loads or a large construction workforce

and are not likely to generate large volumes of waste to be removed from site. The measures set out within the draft CoCP will be fully complied with and, therefore, no significant effects on road traffic and transport during construction are anticipated.

- 4.4.52 The site is to be used as a satellite depot and during operation the number of additional traffic movements is likely to be limited to periodic deliveries, waste collection and staff movements. As this site is located within an urban area and was originally designed as a depot, road access to and from the site is adequate. The impact on local road traffic and the transport network is not likely to be significant during operation and therefore no significant effects have been identified.
- 4.4.53 In terms of impacts on the rail network the movement of trains to and from the depot will utilise available train paths and will comprise a very small percentage of total train movements on the classic rail network. The effects on the rail network are not likely to be significant.

Waste and material resources

- 4.4.54 During the renovation works, waste and materials management will be dealt with in accordance with the CoCP. Material quantities are not expected to be substantial due to the limited scope of the construction works. As a result, the quantity of waste arising during restoration works is not expected to be substantial.
- 4.4.55 Since Longsight International depot will be used as a satellite depot it is not expected to give rise to substantial quantities of operational waste.
- 4.4.56 No significant environmental impacts are likely from waste or in terms of material resources and therefore no significant effect has been identified.

Water resources and flood risk assessment

- 4.4.57 The site is not in an area at risk of flooding and is not adjacent to any main rivers, streams or waterbodies.
- 4.4.58 However, it does lie above the Manchester and East Cheshire Permo-Triassic Sandstone aquifers which the Environment Agency has categorised as 'Poor' in terms of qualitative and chemical quality. In terms of the Environment Agency's groundwater vulnerability zones the site is classified as 'Major Aquifer High'.
- 4.4.59 The site is not in a groundwater source protection zone but the Environment Agency seeks to restrict any activities that may pollute water supplies in the area.
- 4.4.60 The site will be fully surveyed for drains, culverts, services etc. and developed in accordance with current standards for depot management. Surface water run-off will be attenuated and discharged at a controlled rate and measures such as bunds will be put in place to manage run-off during both the construction and operational phases of the depot where necessary. Any discharges to water will be subject to appropriate consents.
- 4.4.61 Measures set out within the draft CoCP will be complied with during the construction works and, as a result, no significant effects on water resources are anticipated.

4.5 Polmadie depot, Glasgow

Introduction

- 4.5.1 Polmadie depot is an existing depot approximately 1.5km south-east of Glasgow city centre, see Figure 6. The depot lies adjacent to the London to Glasgow mainline railway.

Figure 6: Location of Polmadie depot



Existing land use

- 4.5.2 Polmadie depot is currently used for the stabling of up to 16 trains each night including eight Pendolino and eight Voyager units. During the day two Caledonian Sleeper trains are also serviced in the depot.
- 4.5.3 The site is used for the servicing of the trains including emptying and filling of tanks and exterior and interior cleaning.
- 4.5.4 The depot has a number of external rail sidings, four of which are capable of accommodating zoom trains. Currently, three of the sidings are used for overnight stabling. An additional siding contains the automatic carriage washing equipment and there are two reception rail sidings which provide greater operational flexibility.
- 4.5.5 The maintenance shed is capable of accommodating five 260m Pendolino trains.
- 4.5.6 Rail access to the depot is available from the north and from the south.

Proposed works

- 4.5.7 A series of basic renewal works will be required to update equipment at the depot to ensure alignment and compatibility for servicing HS2 rolling stock including the updating of CET facilities. Other works required might include the updating of track lighting, signalling and overhead line equipment.
- 4.5.8 There are no land requirements and no new buildings are proposed.

Proposed operational activities

- 4.5.9 During Phase One operations the depot will be used for the stabling of four HS2 classic compatible trains and five Pendolinos.

Overview of likely environmental effects

- 4.5.10 Polmadie depot is already fully operational; there are no additional land requirements and no significant physical works are proposed.
- 4.5.11 Existing operations involve more than 16 trains using the depot for cleaning and maintenance each night plus two trains during the day. Noise, visual or air quality impacts are managed in line with Network Rail operating guidelines.
- 4.5.12 Within this context, the use of the depot for the overnight stabling of four HS2 classic compatible trains is not likely to create significant environmental effects.

4.6 Summary of likely residual significant effects

- 4.6.1 Four off-route depots (Edge Hill, Longsight, Longsight International and Polmadie) have been identified for the off-route stabling of HS2 classic compatible trains during Phase One operations.

Edge Hill, Longsight and Polmadie depots

- 4.6.2 No land requirements or significant physical works are required to stable nine HS2 classic compatible trains at Edge Hill, eight at Longsight and four at Polmadie depots.

4.6.3 These depots are currently operational and have capacity to accommodate HS2 classic compatible service trains.

4.6.4 No significant adverse environmental effects were identified.

Longsight International depot

4.6.5 Longsight International depot is currently not operational. No land is required but restoration works are required to the shed and rail sidings to bring the depot back into operational use.

4.6.6 An environmental assessment has been undertaken and a number of environmental aspects have been considered. Site surveys were undertaken for noise, ecology and visual assessment purposes.

4.6.7 No significant adverse environmental effects were identified.

Mitigation

4.6.8 As no significant adverse environmental effects are likely, no further mitigation is proposed at any of the off-route depots.

Likely residual significant effects

4.6.9 No likely significant residual environmental effects have been identified at any of the off-route depots.

5 Modifications to the WCML between Lichfield and Colwich

5.1 Introduction

5.1.1 A limited number of changes to the existing WCML infrastructure, and its connections to the Chase Line and North Staffordshire Line, will be required to facilitate the proposed connection with HS2 at Handsacre and to maintain operational flexibility on the existing WCML railway. This section outlines those changes, as well as the potential environmental effects associated with these modification works. All map references mentioned within this section relate to the Volume 4: Off-route effects Map Book.

Overview of the area and scope of the assessment

5.1.2 The WCML between Lichfield and Colwich (see Figure 7) extends over a length of approximately 17.2km from Lichfield Junction (Map CT-06-148, I4) just north of the Lichfield Trent Valley station to Colwich Junction (Map CT-06-147, B6 and B7).

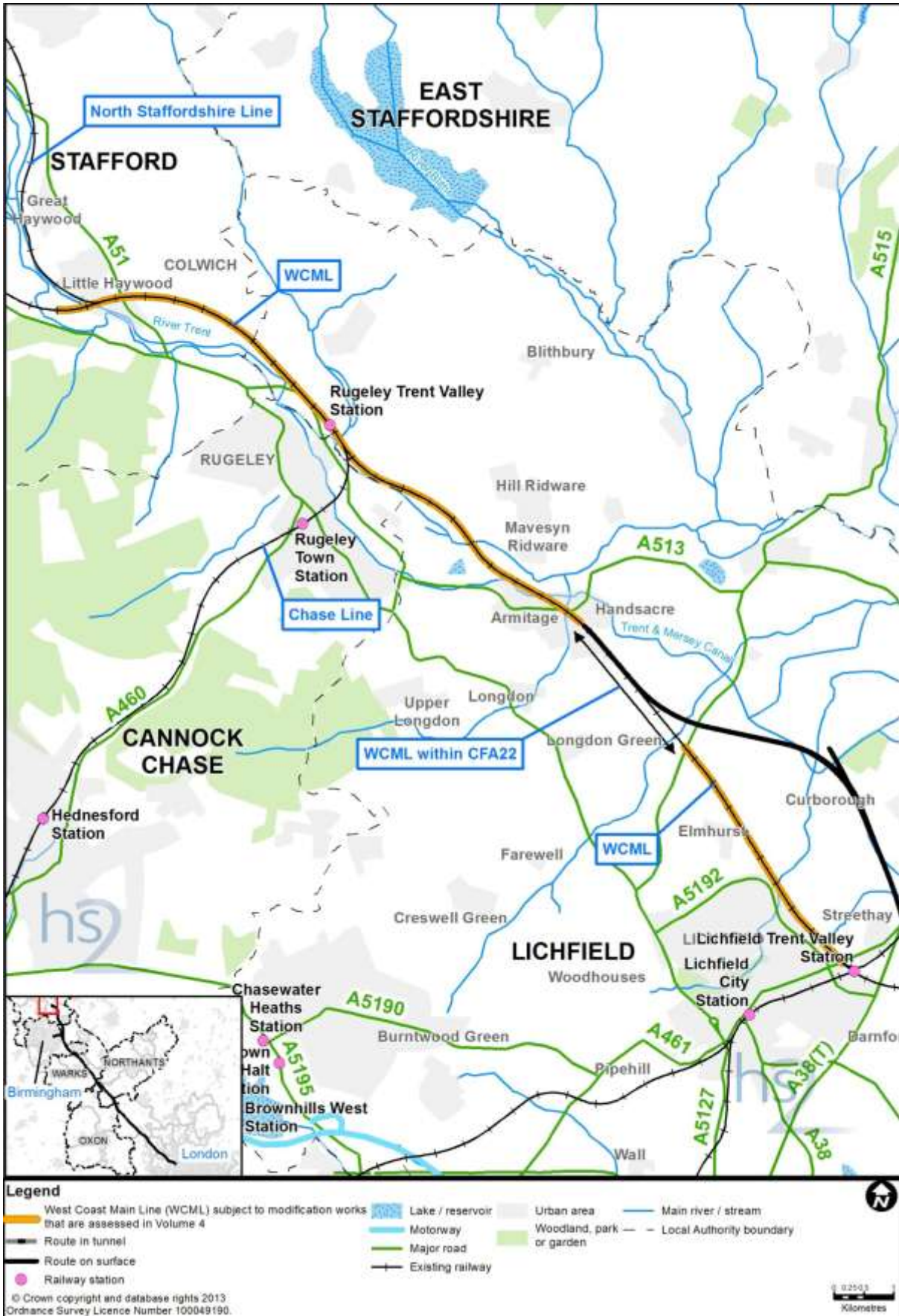
5.1.3 The environmental effects of the WCML modification works from approximately the A515, Lichfield Road (Map CT-06-129b-L1, E2) to the B5014 Lichfield Road in Handsacre (Map CT-06-130b, B6) are reported within Volume 2: CFA report 22.

5.1.4 This assessment addresses the two areas of the WCML where works take place off-route:

- the section from Lichfield Junction to the A515 Lichfield Road; and
- the section from the northern CFA22 boundary at the B5014 Lichfield Road to Colwich Junction.

5.1.5 Within these two sections, which comprise a length of approximately 14.7km, modifications will take place at discrete locations rather than over the full length of existing railway. Modifications will only be made over approximately 6.7km of this length (map series CT-06).

Figure 7: Area context map



5.2 Description of the Proposed Scheme

5.2.1 The Proposed Scheme in this area includes the construction of new signalling equipment to control train movements, track alignment alterations, some additional crossovers¹³ to allow trains to switch tracks, some minor alterations to overhead line electrification to accommodate the track alterations and the provision of ancillary lineside equipment associated with the above.

5.2.2 The modifications to the WCML for the Proposed Scheme will include:

- the alteration of track at Colwich and Rugeley within the existing WCML rail boundary;
- new signalling layout, which entails the removal and replacement of gantries and/or cantilever structures;
- installation of new relocatable equipment buildings;
- installation of new track switches¹⁴ and crossovers;
- construction of permanent and temporary access routes;
- provision of 18 temporary crane platforms to remove and replace signal structures;
- provision of two satellite construction compounds for laydown and storage, one of which utilises an area of existing hardstanding; and
- use of existing rail sidings at Lichfield and Rugeley to store rail mounted plant.

5.2.3 This assessment has been based on the assumption that on the commencement of Phase One, the number of trains using the WCML between the junction at Handsacre and Colwich junction will increase by up to three trains per hour in each direction. The number of trains using the WCML south of Handsacre junction will reduce as a result of the diversion of long distance services onto the new HS2 railway.

5.2.4 The modifications to the WCML will allow an increase in speed of some services between Handsacre and Colwich. The speed on the outer (slow) lines of the WCML between Handsacre and Colwich has been increased to a maximum speed of 125mph, which matches the existing speed of the central (fast) tracks. Through the junction at Colwich the Proposed Scheme permits an increase in speeds of up to 100mph on the WCML and up to 60mph on the North Staffordshire Line.

5.2.5 Map series CT-06 illustrates the Proposed Scheme and the location of the permanent works described in this section.

On-track works

5.2.6 On-track works will include the alteration of existing tracks and the provision of new track switches and crossovers. The areas where these track alterations will occur are

¹³ A crossover is a pair of switches that connect two parallel rail tracks, allowing a train on one track to cross over to the other.

¹⁴ A switch is a mechanical installation enabling railway trains to be guided from one track to another, such as at a railway junction or where a spur or siding branches off.

shown on map series CT-06. New overhead lines will be installed for the new track. Redundant tracks and overhead lines will be recovered.

- 5.2.7 There are two areas where tracks will be realigned within the existing Network Rail footprint. Immediately to the south of Rugeley Trent Valley Station, the Chase Line will be realigned approximately 2m to the west, towards the A51, over a distance of approximately 940m. The WCML and North Staffordshire Line will also be realigned at Colwich Junction. The WCML will be realigned slightly to the south towards Main Road, over a distance of approximately 1,070m by a maximum of 1.5m. The North Staffordshire Line will be realigned towards the Trent and Mersey Canal over a distance of approximately 390m by a maximum of 2m. These works will be contained within existing railway land. These realignments, in conjunction with the provision of new crossovers, will enable trains to pass through the junctions at slightly increased speeds.

Signalling works

- 5.2.8 Fourteen new signal gantries will be constructed as shown on map series CT-06. All will be four-track gantries except the two twin-track gantries located at Maps CT-06-146, I3 and CT-06-147, G5. The height of the structures is governed by the clearance requirements for the overhead lines and will, therefore, be unchanged from the height of the existing signal structures, which is approximately 8m to 10m.
- 5.2.9 Six twin-track cantilever gantries will be removed, as shown in map series CT-05.

Off-track works

- 5.2.10 Four new relocatable equipment buildings¹⁵ will be installed off-track (Maps CT-06-145, H6, F6, and D6 and CT-06-147, D6). Existing access routes will be used in all but one location, where a new permanent access route will be constructed to allow Network Rail to maintain the facility (Map CT-06-145, F6).

Construction of the Proposed Scheme

- 5.2.11 General provisions relating to the construction process are set out in more detail in Volume 1 (Section 6.4) and the draft CoCP (Volume 5: Appendix CT-003-000). Key provisions in Section 4 of the draft CoCP that are of relevance to this assessment include:

- the approach to environmental management and the role of the CoCP;
- control of noise and vibration;
- working hours;
- operation of site compounds;
- management of construction traffic; and
- handling of construction materials.

¹⁵ A relocatable equipment building is a prefabricated modular building used to house rail systems equipment.

- 5.2.12 Works within the existing railway network will involve a combination of civil engineering and/or railway installation works. Map series CT-05 illustrates the land required temporarily to construct the Proposed Scheme.
- 5.2.13 All works will be coordinated from construction compounds, which will include the Handsacre A515 main compound, which is located within the Whittington to Handsacre area (CFA22), supported by two satellite compounds (see Table 2). Information on the construction compound within the Whittington to Handsacre area (CFA22) can be found in Volume 2: CFA report 22, Section 2.3. The use of both satellite compounds will be limited to the WCML modification works. In addition, the existing railway sidings located at Lichfield (Map CT-05-148, G4) and Rugeley (Map CT-05-145, H6) will be used to store rail mounted construction plant for the duration of the WCML works.
- 5.2.14 The duration for the WCML works, in total, will be approximately two years, and are expected to commence in 2021. Where reasonably practicable, these works will be scheduled to minimise cumulative impacts with Network Rail maintenance and renewal works. The Handsacre A515 main compound and the two existing railway sidings will be used intermittently throughout that period, while the two satellite compounds will be required over a shorter timescale as set out in Table 2. The nature of the works, and the constraints of working with the existing operational railway, means that construction will be undertaken using a phased approach, programmed around the required track possessions. Construction activity at a particular location will be of limited duration, other than at the compounds and track access points.

Table 2: Satellite construction compounds for the WCML modifications

Location	Principal construction activity	Start date	Estimated duration of use	Number of workers (average/peak)	Highways access route
Armitage Shanks satellite compound (Map CT-05-142, G6)	WCML track works Signal installation	2022	12 months (site will not be operational throughout as works will be organised around available track possessions).	25/65	Via Old Road then A513 New Road
A51 satellite compound (Map CT-05-121, E5 and F5)	WCML track works Signal installation	2022	12 months (site will not be operational throughout as works will be organised around available track possessions).	30/170	Via A51 Tamworth Road

- 5.2.15 A summary of standard construction techniques is provided in Volume 1, Section 6.
- 5.2.16 Although certain elements of the Proposed Scheme can be constructed from within Network Rail land using rail mounted construction plant, land will be required on a temporary basis to install the signal structures and for the temporary satellite compounds as shown on map series CT-05.
- 5.2.17 Temporary access for the installation of signal gantries will be short term and across open ground via existing farm tracks or, where not available, via temporary access routes constructed across fields. In both cases, an all-terrain mobile crane will be used to facilitate access across uneven ground.

- 5.2.18 With respect to the signal structures, at each location, a temporary level and stable platform will be created adjacent to the existing track for a crane to be sited, which will then lift the signal structure into place during a temporary possession of the track. These temporary track possessions will typically be taken overnight so as not to disrupt daytime use of the line, either on weekday nights, at weekends, or over bank holidays. The temporary crane platforms will only be operational for the track possessions and they will not have welfare facilities.
- 5.2.19 The same method will also be used for the removal of signal structures. On completion, the crane, platform and access route will be removed and the land returned to its current use.
- 5.2.20 Rail mounted construction plant will be used for the track alterations and for the installation of signal foundations, which are likely to be piled. As with the gantry installations described, the track and foundation works will take place during temporary line possessions using a phased approach.
- 5.2.21 Construction works will be planned and integrated with the Network Rail route programme in accordance with industry planning timescales. It is expected that Network Rail would be undertaking routine renewal works in this area, which are anticipated to be adapted to include works required for the Proposed Scheme.

5.3 Environmental baseline

- 5.3.1 The baseline environment is dominated by the presence of the existing WCML, which is a four-track electrified railway. Gantries supporting the overhead lines are interspersed with signal structures and other smaller ancillary lineside equipment. The railway is largely on embankment through the area, but there are sections in cutting and at grade with the surrounding topography.
- 5.3.2 The WCML is orientated approximately south-east to north-west and broadly follows the valley of the River Trent north of Handsacre. The Trent and Mersey Canal also follows a similar course. Both watercourses are crossed by the WCML.
- 5.3.3 The area in which the WCML is situated is in the district of Lichfield in Staffordshire, passing into the district of Stafford north of Rugeley. The WCML passes through the developed areas of Lichfield, Handsacre, Rugeley, and Colwich.
- 5.3.4 Outside the urban areas, there are smaller villages, isolated dwellings, farmsteads, and storage uses, some of which lie in close proximity to the railway.
- 5.3.5 The area surrounding the railway is predominantly rural in character, with agriculture being the main land use.
- 5.3.6 The A515 Lichfield Road, A513 New Road and the A51 are the main highways that cross the WCML in this area, although several other minor roads also cross the railway.
- 5.3.7 The main sensitive receptors include the towns and villages of Handsacre, Armitage, Rugeley, Colwich and Little Haywood, isolated farms and houses, local shops, places of worship, and other community facilities. Other sensitive receptors include the Trent

and Mersey Canal (which is a conservation area), various surface water features, a golf course, and areas of woodland.

- 5.3.8 There are 28 designated heritage assets within 500m of the Proposed Scheme, including one area of ancient woodland at Tomhay Wood, five conservation areas on the Trent and Mersey Canal, at Mavesyn Ridware, and around Colwich and Little Haywood, two scheduled monuments (a circular earthwork at Bishton Hall and a moated site near St. Michael and All Angels, Colwich), and three Grade II* listed buildings (the Church of St. John, Armitage, Bishton Hall and St. Michael and All Angels parish church, Colwich). The other designated sites are Grade II listed buildings. There are also numerous undesignated assets within the study area including historic buildings and archaeological sites.
- 5.3.9 There are 30 non-designated heritage assets of low to moderate value within 500m of the Proposed Scheme. These include non-designated buildings and structures of historic interest, structures on the Trent and Mersey Canal, Armitage Lodge Park, Bellamour Hall and Landscape Park, Bishton Hall Park and below ground archaeological sites within the valley of the River Trent, including significant prehistoric sites.
- 5.3.10 Based on published information using the guidelines for the classification of agricultural land¹⁶, most of the study area along the WCML modification works is in the best and most versatile (BMV) land categories of Grade 2 and Subgrade 3a. There are areas of Grade 4 on the Trent floodplain and Subgrade 3b where soils are shallow over gravel and sandstone or are heavy textured.
- 5.3.11 Outside of the mainly agricultural areas, wet pasture and heath and moor are the other prominent landscape types of the area. The area lies within Cannock Chase and Cank Wood, Needwood and South Derbyshire Claylands, and the Trent Valley Washlands national character areas¹⁷. Cannock Chase Area of Outstanding Natural Beauty includes a short length of the WCML within the scheme extent, north-west of Colwich.
- 5.3.12 Additional baseline information is provided in the analysis of environmental effects for the Lichfield to Colwich modification works, which is provided in Section 5.5, and in Volume 5: Appendix CT-007-000.

5.4 Methodology

- 5.4.1 An environmental assessment has been conducted for the following environmental topics: agriculture, forestry and soils; air quality; community, cultural heritage; ecology; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration; traffic and transport; waste and material resources; and water resources and flood risk.

¹⁶ Ministry of Agriculture, Fisheries and Food (1988), *Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land*.

¹⁷ National character areas are defined by a unique combination of landscape, biodiversity, geodiversity and cultural economic activity. Their boundaries follow natural lines in the landscape.

5.4.2 The assessment of environmental effects has broadly followed the methodology set out in the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2). However, due to a variety of factors, including the limited scope of works being undertaken on the existing WCML and limitations regarding site access (to both private and Network Rail land), some topic assessments vary from the SMR approach. The following are the exceptions to general assessment methodologies:

- cultural heritage – due to the relatively minor nature of the works, the baseline data collection area was reduced from 2km to 500m beyond the land required, temporarily or permanently, for the construction of the Proposed Scheme. Baseline data for the study area was obtained from the National Heritage List (NHL) and Staffordshire County Council Historic Environment Record (HER);
- ecology – due to the relatively minor nature of the works and due to lack of land access, an extended Phase 1 habitat survey has been carried out only from public rights of way (PRoW), supplemented by a desk assessment. Baseline data for the study was available from Natural England, Staffordshire Ecological Record and the Multi-Agency Geographic Information for the Countryside;
- land quality – the land quality analysis was accomplished using desktop data collection. Site visits were not considered necessary based on the minor nature of the works;
- landscape and visual assessment – the visual assessment was based on focused field surveys. Due to the relatively minor nature of the proposed works, the visual assessment methodology used fewer viewpoints per kilometre than recorded for Volume 2: CFA22, Section 9;
- socio-economics – this analysis follows the standard assessment methodology, with the exception of undertaking a business survey to collect business information;
- sound, noise and vibration – representative noise sampling was undertaken at four locations within publically accessible land;
- traffic and transport – detailed assessments were limited to the two satellite compounds to be used throughout the modification works as the durations associated with individual work sites were less than four weeks; and
- water resources and flood risk – the SMR has been followed to the extent that the data required is available. Some information relating to sewer flood risk was not available. However, given the minor nature of the works it is considered unlikely that this would significantly alter the conclusions of the assessment.

5.5 Avoidance and mitigation measures

5.5.1 Table 3 lists measures that have been included as part of the Lichfield to Colwich modifications in order to avoid or reduce impacts.

Table 3: Avoidance and mitigation measures for the WCML modifications

Environmental topic	Measures
Agriculture	Compliance with the draft CoCP measures relating to adoption of good practice techniques in liaison and advisory arrangements with affected landowners, handling, storing and reinstating soils, soil disturbance, land drainage, agricultural access, fencing and water supply (draft CoCP, Section 6).
Air quality	Compliance with the draft CoCP measures relating to siting of construction machinery and compliance with equipment manufacturer specifications, site enclosures, movement of construction vehicles, and dust and air quality management (draft CoCP, Section 7). Measures will be implemented to limit pollution arising from the transportation and storage of materials.
Community	Compliance with the draft CoCP measures relating to air quality, land quality, landscape and visual assessment, sound, noise and vibration, and traffic and transport.
Cultural heritage	Compliance with the draft CoCP measures relating to protection and investigation of heritage assets (draft CoCP, Section 8).
Ecology	Compliance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2). Compliance with the draft CoCP measures relating to species habitat management plans, identification of habitat, minimising construction footprint, and providing replacement landscaping (draft CoCP, Section 9); protection of retained habitat, including trees (draft CoCP, Section 12); control of dust (draft CoCP, Section 7); control of water quality (draft CoCP, Section 16); control of noise and vibration (draft CoCP, Section 13); and lighting (draft CoCP, Section 5).
Land quality	Compliance with the draft CoCP measures and further desk and site based investigation to identify if landfill leachate/gas is present and to assess whether piles are likely to provide a preferential pathway for groundwater or gas migration (draft CoCP, Section 11). Provision of passive venting in enclosed structures, should risks from landfill gas be confirmed.
Landscape and visual assessment	Compliance with the draft CoCP measures relating to landscape measures and the protection and mitigation of adverse effects on sensitive and valued landscape features and characteristics (draft CoCP, Section 12); control of dust (draft CoCP, Section 7); and lighting (draft CoCP, Section 5).
Socio-economics	Compliance with the draft CoCP measures relating to air quality, sound, noise and vibration and landscape and visual (draft CoCP, Section 12).
Sound, noise and vibration	Compliance with the draft CoCP measures relating to control of sound, noise and vibration during construction (draft CoCP, Section 13).
Traffic and transport	Compliance with the draft CoCP measures relating to generic and site-specific traffic management measures implemented during the construction of the Proposed Scheme on or adjacent to public roads, bridleways, footpaths and other public rights of way affected by the Proposed Scheme (draft CoCP, Section 14).
Waste and material resources	Compliance with the draft CoCP measures relating to efficient use of material resources and reduction in waste at source (draft CoCP, Section 15) and pollution incident control measures (draft CoCP, Section 5).
Water resources and flood risk assessment	Compliance with the draft CoCP measures relating to surface water and groundwater control measures (draft CoCP, Section 16) and limiting adverse dust and air pollution effects to limit the likelihood of polluted surface water run-off being generated (draft CoCP, Section 7). Good practice measures relating to pollution prevention including the Environment Agency's Pollution Prevention Guidelines ¹⁸ .

¹⁸ Environment Agency; Pollution prevention advice and guidance (PPG); <http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx>; Accessed: 10 October, 2013.

5.6 Assessment of impacts and effects

5.6.1 This section of the report describes the assessment of the environmental effects of the WCML modification works from Lichfield to Colwich, excluding that portion within CFA22. The term 'route' is also used throughout Section 5.5 to refer to the WCML from Lichfield to Colwich.

5.6.2 Each environmental topic includes a brief description of the environmental baseline within the area that is specific to that topic, the likely environmental effects arising during construction and operation of the Proposed Scheme, and any proposed mitigation measures. Maps CT-19-200 to CT-19-205 illustrates the environmental baseline for the area. The assessment presented has taken into account the avoidance and mitigation measures described in Section 5.5.

5.6.3 Topic appendices supporting the overview provided in the following sections can be found in Volume 5: Appendix CT-007-000.

Agriculture, forestry and soils

5.6.4 The land flanking the River Trent possesses important flood storage capacity properties, and all of the land in this area is designated a nitrate vulnerable zone, which is designed to protect the quality of groundwater.

5.6.5 There are eight agricultural holdings affected by the modification works in this area, as illustrated on map series CT-19 (Volume 4: Off-route effects Map Book). These holdings are primarily mixed farms with arable crops (including cereals and potatoes) and livestock. Diversified farm holding activities include a commercial coarse fishery with educational facilities, equestrian enterprises, food processing enterprises and a reclaimed building materials business. The sensitivity of these holdings is assessed as medium to high.

5.6.6 Compliance with measures set out within the draft CoCP will avoid or reduce environmental impacts during construction. Of particular relevance to agriculture, forestry and soil are issues relating to soil disturbance, land drainage, access, fencing, water supply and temporary disruptive effects such as noise and dust (see Volume 5: Appendix CT-003-000).

5.6.7 There will be the temporary use of a small area of BMV land during construction. However, all temporary works, such as temporary access routes and temporary crane platforms, will be removed and land will be reinstated to its original physical characteristics after construction has taken place. Therefore, there will be no reduction in the long-term quality of the BMV land. The residual effect has been assessed as not significant.

5.6.8 None of the agricultural holdings will experience temporary significant adverse effects. The short duration of the proposed works will be managed in accordance with the CoCP and compensation, where appropriate, to accommodate farming activity and the needs of associated diversified businesses.

5.6.9 There are no permanent, construction-related effects on agriculture, forestry and soil resources.

- 5.6.10 There are no likely residual significant effects during operation.

Air quality

- 5.6.11 A construction dust assessment was undertaken to assess effects on locations that will be in close proximity to dust-generating activities where there were human or ecological receptors present. Overall, the construction dust assessment determined that air quality effects will not be significant.
- 5.6.12 Construction activity could also affect local air quality through the emissions associated with additional traffic generated on roads as a result of construction traffic routes. Screening was undertaken using the criteria given in Section 5 of the SMR (Volume 5: Appendix CT-001-000/1) to identify locations requiring more detailed assessment. No locations met the criteria for more detailed assessment, and the effect of traffic emissions during the construction phase will not be significant.
- 5.6.13 There are no permanent effects anticipated to arise during construction of the Proposed Scheme.
- 5.6.14 There are no direct atmospheric emissions from the operation of trains that could cause an impact on air quality. Operational traffic changes were screened to identify roads that required more detailed assessment. No locations met the criteria for more detailed assessment, and the effect of traffic emissions during the operational phase will not be significant.

Community

- 5.6.15 Community receptors adjacent to or within 1km of the route include recreational uses, open space, churches, schools, convenience shops/general stores, village greens, allotments, village halls, medical facilities, key recreational routes and public houses. The construction of the works will not cause any impacts on open spaces, or key recreational routes that will give rise to a temporary or permanent significant adverse effect related to loss of land, amenity or isolation impacts.
- 5.6.16 The operation of the works, which will result in increased train frequencies, will not cause any impacts on community facilities, open spaces, or key recreational routes that would give rise to a permanent significant adverse community effect related to loss of land or amenity impacts.

Cultural heritage

- 5.6.17 North of Lichfield is predominantly an 18th and 19th century rural landscape characterised by dispersed farmsteads and rural buildings, as well as by the structures and buildings of the Trent and Mersey Canal around Handsacre, Armitage and Colwich, some of which are designated assets.
- 5.6.18 The Trent and Mersey Canal Conservation Area intermittently intersects the study area. The canal is historically linked with the railway, as the rise of rail transport led to the decline of the canal as an industrial transport method. Although the Proposed Scheme intersects with the canal in several locations, the work on the existing WCML would not impact any of the characteristics of the conservation area. The village of Armitage is largely of 18th and 19th century date, with examples of medieval buildings

along Old Road and on Church Lane. Armitage Park lies south of the railway line, west of the town.

- 5.6.19 The village of Armitage is largely of 18th and 19th century date, with examples of medieval buildings along Old Road and on Church Lane. Armitage Park lies south of the railway line west of the town.
- 5.6.20 From Armitage to Colwich the landscape is within the Trent Valley. The River Trent was a focus of settlement in the prehistoric and Roman periods. Evidence of the later prehistoric periods has been found adjacent to and near the Proposed Scheme including at Mavesyn Ridware where a Neolithic causewayed enclosure is known approximately 400m from the land required for the construction of the Proposed Scheme.
- 5.6.21 Water meadows, possibly in use since the medieval period, survive in places along the Trent between the railway line and Rugeley. Evidence of the later prehistoric periods has been found adjacent to the railway line at Cawarden Springs Farm and nearby at Lawnmeadow Covert. The town of Rugeley developed in the post medieval period with significant growth towards the railway line, and with major industrial development in the 20th century.
- 5.6.22 Between Rugeley and Colwich, Bishton Hall Park, an 18th century estate, lies just south of the railway line. Colwich itself originated in the medieval period and is known for its abbey (St. Mary's) and the parish church of St. Michael, which lies on the Main Street. The townscape of Colwich is now dominated by 19th and 20th century housing.
- 5.6.23 The Colwich and Little Haywood Conservation Area consists of the historic core of each of these villages, linked together by the old A51. Though the villages originate at a much earlier time, the majority of the buildings that contribute to the significance of the conservation area date from the late 18th to 19th centuries, and are linked to the development of the railways. Works required within the conservation area comprise the construction of a temporary crane platform, and track modifications. The only significant building within the conservation area that would be impacted by the work is the Colwich Church of England Primary School, a Grade II listed building (see below). The WCML is an integral part of the conservation area, and the proposed works within the conservation area would not adversely impact either the significance of the railway within the conservation area nor the significance of any contributing buildings or groups of buildings.
- 5.6.24 Colwich Church of England Primary School, a Victorian listed building Grade II (NHL1273481), and of moderate value, is located south of the railway track. While the school faces southwards away from the railway line, the railway is a dominant feature in its setting, visible and audible from the back of the building. There are views of the railway from the rear parking area of the school. From this area, there will be views of the crane platform for a short period of time while the existing signal gantries are removed and new signal gantries are installed. The crane platform will be removed once the signal gantries are installed and the area will be returned to its original condition. No effects will arise from installation of a temporary crane platform in this location.

- 5.6.25 No designated heritage assets lie within the land required for the construction of the Proposed Scheme.
- 5.6.26 As set out in Volume 5: Appendix CT-007-000, Section 5, the construction of the Proposed Scheme may result in permanent adverse impacts on currently unknown archaeological remains within the land required, temporarily and permanently, for the construction of the Proposed Scheme. Potential impacts will be addressed through the implementation of measures set out in the draft CoCP (Section 8.1 to 8.3).
- 5.6.27 There will be no significant operational effects.

Ecology

- 5.6.28 There are no statutory designated sites of importance for nature conservation within 500m of the land required for construction of the Proposed Scheme.
- 5.6.29 There are six non-statutory designated sites of importance for nature conservation within, or adjacent to, the land required for construction of the Proposed Scheme which are relevant to the assessment. These are as follows:
- Trent and Mersey Canal from Armitage Church to Tuppenhurst Road Site of Biological Importance (SBI) (MapCT-19-202, F5 to A8), a stretch of canal with botanically diverse marginal vegetation, which is located 15m to the north-west of a proposed access point;
 - Lawnmeadow Covert and Ridware Hall SBI (Map CT-19-203, H4 and G4), a shallow lake with extensive marginal vegetation and adjoining woodland, which is located 60m to the south of a proposed temporary access route;
 - Cawarden Springs Wood SBI (Map CT-19-203, D6) an area of remnant ancient semi-natural woodland, which is located 50m to the north of two proposed temporary crane platform sites;
 - Brereton Works SBI (Map CT-19-203, A9 and B9), a disused quarry with importance for invertebrates, which is located immediately adjacent to the railway line at Rugeley Junction where proposed works are confined to the existing WCML boundary;
 - Bishton Biodiversity Alert Site (BAS) (Map CT-19-205, G3), which comprises species rich woody hedgerows either side of a country lane, is located approximately 50m to the north of a temporary crane platform site; and
 - Colwich Brickworks SBI (Map CT-19-205, E5 and F5), a disused quarry with areas of typical disturbed ground vegetation, is located approximately 60m to the north of a temporary access route.
- 5.6.30 There will be no land required for construction of the Proposed Scheme within these designated sites and no significant effects on the integrity of the designated sites are expected.

- 5.6.31 The temporary crane platform shown on Map CT-05-143, F4 will be located adjacent to the edge of a floodplain grazing marsh which is a habitat of principal importance as identified in section 41 of the Natural Environment and Rural Communities Act 2006¹⁹. A site survey from a PRow which passes through the area has found that the habitat present within the works footprint at this location comprises poor semi-improved grassland which is heavily grazed by sheep and cows. The works will not result in loss of, or changes to, the hydrological setting of the grazing marsh and there are no significant effects expected on the conservation status of the habitat.
- 5.6.32 The majority of the land required for construction of the Proposed Scheme is located within areas of hardstanding, arable fields, improved grassland and existing unpaved farm access routes, which are all considered to be of negligible value. The following habitats are also present: hedgerows; mature and semi-mature trees; poor semi-improved grassland; scrub; and tall ruderal vegetation. These habitats are each likely to be up to local/parish value. The route crosses a number of watercourses. However, works at these locations are restricted to alterations to the railway lines within the existing WCML boundary.
- 5.6.33 Works will follow measures within the draft CoCP (Volume 5: Appendix CT-003-000). Temporary construction access routes will be routed to avoid hedgerows and mature trees and to use existing farm access routes and field entrances wherever possible. The majority of works will also be within the existing boundary of the WCML. However, the Proposed Scheme will result in the loss of habitats including: hedgerows, mature and semi-mature trees, poor semi-improved grassland, scrub, and tall ruderal vegetation. Due to the relatively minor footprint of the Proposed Scheme and with avoidance measures in place, these losses are unlikely to have an adverse effect on the conservation status of these habitats and would not be significant. Any hedgerows, scrub and trees removed will be replaced following completion of construction.
- 5.6.34 The habitats present within the land required for the Proposed Scheme have the potential to support protected species, including great crested newt, reptiles, roosting bats, badgers and nesting birds. The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000), which includes translocation of protected species where appropriate.
- 5.6.35 Numerous ponds, which may have potential to support breeding populations of great crested newt and other amphibians are present within 250m of the Proposed Scheme and suitable terrestrial habitat for amphibians is present within the land required for the Proposed Scheme (as further described in Volume 5: Appendix CT-007-000, Section 6). A number of ponds are located immediately adjacent to the course of temporary access routes which follow existing farm tracks. However, there are no ponds present within the land required for the Proposed Scheme. The majority of terrestrial habitats affected would be arable fields, poor semi-improved grassland and existing farm access routes which are of negligible value and are not optimal for foraging, resting or hibernating great crested newt or other amphibians.

¹⁹ Her Majesty's Stationery Office (2006), *Natural Environment and Rural Communities Act 2006*

- 5.6.36 The construction process may cause temporary loss of habitats used by reptiles, bats, nesting birds, and badgers together with temporary disturbance. The majority of terrestrial habitats affected would be arable fields, poor semi-improved grassland and existing farm access routes which are of negligible value and are not optimal habitat for these species. In areas of open farmland small areas of habitat loss would cause minimal effect as there are plenty of suitable alternative habitats nearby. Due to the relatively minor footprint of the Proposed Scheme and with avoidance measures in place, the impacts are unlikely to have an adverse effect on the conservation status of great crested newt, bats, reptiles, badgers or nesting birds and would not be significant.
- 5.6.37 Measures to avoid the potential killing, injury and disturbance of protected species including great crested newt, roosting bats, reptiles, badgers and nesting birds will be provided in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2).

Land quality

- 5.6.38 While the land surrounding the WCML is predominantly in agricultural use, sewage settling ponds, light industrial uses, a power station, and historical landfills are also present. The Proposed Scheme also crosses a mineral consultation area for sand and gravel in several locations (to the east of Rugeley Power Station and from Rugeley almost to the northern end of the Proposed Scheme). No geo-conservation resources have been identified.
- 5.6.39 Receptors include residents and users of off-site properties; people accessing land adjacent to the site; Principal, Secondary A, and Secondary B aquifers; the River Trent; the Trent and Mersey Canal; and existing property structures and infrastructure.
- 5.6.40 Potential impacts have been identified in areas where below ground works will be undertaken in close proximity to existing potential sources of contamination.
- 5.6.41 Historical landfills have been identified at Rugeley Power Station, adjacent to the Trent and Mersey Canal, and at the former Colwich brickworks. Works will be undertaken within 250m of all these landfills. Due to the age of the Colwich brickworks, historical landfill (over 50 years) and the distance of the landfill from the closest area of intrusive works (approximately 175m), there is considered to be a negligible effect from works in this area.
- 5.6.42 The landfills at Rugeley Power Station and adjacent to the Trent and Mersey Canal will not be disturbed, but are approximately 50m from the WCML, and if landfill gas and landfill leachate is being produced, any below-ground construction works could create a pathway for the migration of gas or landfill leachate. Given the location of the landfills within 250m of the Proposed Scheme, piling foundations for new gantries and below-ground works which may be required in establishing the A51 construction compound and constructing the relocatable equipment building could result in a minor adverse effect during construction.
- 5.6.43 Mitigation measures contained within the draft CoCP which are relevant to the identified impacts include:

- a programme of further desk and site based investigation to identify if landfill leachate/gas is present and to assess whether piles are likely to provide a preferential pathway for groundwater or gas migration (draft CoCP, Section 11); and
- provision of passive venting in enclosed structures, should risks from landfill gas be confirmed.

5.6.44 No residual significant effects are anticipated during the construction or operation of the Proposed Scheme.

Landscape and visual assessment

5.6.45 The landscape character is strongly influenced by the valley of the River Trent. The Trent Valley lowlands are bordered by undulating land to the north-east and Lichfield and Rugeley to the south-west, with the smaller towns of Handsacre and Colwich on either side of the WCML. Visual receptor types are primarily residential.

5.6.46 The landscape setting ranges from woodland and sparsely populated farmland to urban and industrial townscapes with extensive residential elements. The character and scale of the Proposed Scheme will not diverge significantly from those of the existing WCML and the cumulative impact of the changes to the existing railway on the landscape character is considered to be negligible.

5.6.47 The construction activity will be visible from some residential receptors in the adjacent towns and nearby villages and various farms and isolated houses, as well as several PRoW in the context of the existing WCML and often in the context of urban development or industrial uses. The visual effects are assessed as either negligible or minor adverse, depending on the location.

5.6.48 Once completed, the changes in views will be limited to the presence or absence of signal gantries. These will also be seen in the context of the existing railway and often in the context of urban development or industrial uses. The visual effects are assessed as minor adverse and, therefore, are not significant.

Socio-economics

5.6.49 Impacts related to socio-economics would occur if there are impacts to existing businesses and community organisations and, thus, the amount of local employment; local economies, including employment; or planned growth and development. Businesses within the area may experience minor disruptive air quality, noise and vibration, and visual construction and/or operational impacts as a result of the Proposed Scheme. However, these effects would be of extremely limited duration and are not expected to amount to a significant change in amenity that leads to a possible loss of trade for the affected businesses. Further, it is likely that construction of the works will support direct, indirect, and induced jobs, although given the limited scope of the works, it is anticipated that the number of jobs will not be substantial.

5.6.50 Any resulting effects on employment are reported in aggregate at a route-wide level in Volume 3.

5.6.51 There are no significant residual adverse effects arising during construction or operation of the Proposed Scheme.

Sound, noise and vibration

Baseline

- 5.6.52 To support the assessment of construction noise, short term baseline noise monitoring has been undertaken at four locations relevant to the larger items of lineside equipment that would be installed through this section, where they come close to residential areas. Further information is provided in Section 10 of Volume 5: Appendix CT-007-000.
- 5.6.53 For the assessment of operational noise, the existing baseline sound environment at receptors that could be affected by noise from the Proposed Scheme is currently shaped primarily by sound from the existing rail services. These include intercity and stopping passenger services as well as freight services on the WCML. Freight operates at night as well as during the day.
- 5.6.54 The assessment of noise has focused on the changes in railway sound levels that will result from the operation of the Proposed Scheme. These changes have been forecast using the change in rail traffic patterns. As the existing baseline sound levels are defined by the current train movements, no additional baseline monitoring was considered necessary to support the assessment of operational noise effects.
- 5.6.55 If receptors adjacent to the WCML are currently subject to vibration then the source is likely to be existing train services. The assessment of vibration from the Proposed Scheme has therefore focused on the change in vibration levels that result from the change in railway traffic patterns. No baseline vibration measurements have therefore been undertaken.

Effects during construction

- 5.6.56 It is anticipated that there will be night-time working during the majority of works that have to be undertaken during possessions of the existing railway.
- 5.6.57 The assessment takes account of people's perception of noise throughout the day. More stringent criteria are applied during evening and night-time periods, when people are more sensitive to noise, compared to the busier and more active daytime period.
- 5.6.58 The draft CoCP (Volume 5: Appendix CT-003-000, Section 13) developed for the route wide scheme, will be followed for all construction activities and minimisation of effects. The contractors will be required to comply with the terms of the CoCP and appropriate action will be taken by the Nominated Undertaker as required to ensure compliance.
- 5.6.59 In addition to this mitigation, taller screening as described in the draft CoCP²⁰ has been assumed along the edge of the construction site boundary adjacent to residential, commercial and community facility premises near the works at: Handsacre, Rugeley, Colwich and also the isolated residential properties Colton Mill Farm, 6 Colton Road, Rugeley and Overdale, Colwich .

²⁰ As described in the draft CoCP, provided as necessary by solid temporary hoarding, temporary earth stockpiles, screening close to the activities or other means to provide equivalent noise reduction.

- 5.6.60 The mitigation measures will reduce noise inside all dwellings such that it does not reach a level where it would significantly affect²¹ residents.
- 5.6.61 With regard to noise outside dwellings, the assessment of temporary effects takes account of construction noise relative to existing sound levels.
- 5.6.62 In locations with lower existing sound levels²², construction noise effects are likely to be caused by changes to noise levels outside dwellings. These may be considered by the local community as an effect on the acoustic character of the area and hence be perceived as a change in the quality of life. The adverse effects identified on the following community areas are considered to be significant:
- Handsacre: dwellings located closest to the proposed works on A513 New Road: adverse noise effects due to night-time works at Armitage Shanks satellite compound;
 - Rugeley: approximately 5 dwellings located closest to the proposed works on Blithbury Road: adverse noise effects due to a night-time track modification works; and
 - Colwich: approximately 10 dwellings located closest to the proposed works on Dobree Close: adverse noise effects due to night-time track modification works.
- 5.6.63 No significant construction noise effects have been identified at non-residential receptors as track modification works in the vicinity of such receptors are assumed to be undertaken only at night.
- 5.6.64 HS2 Ltd will continue to seek reasonably practicable measures to reduce or avoid these significant effects. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the measures. The outcome of these activities will be reflected in the Environmental Minimum Requirements.
- Effects during operation*
- 5.6.65 The predicted changes to train flows resulting from operation of Phase One are described in Section 5.2.3. These changes, together with the increased speed of services on parts of the WCML, have been used to assess the effects of noise and vibration from the operation of the Proposed Scheme.
- 5.6.66 Avoidance and mitigation measures associated with the Proposed Scheme in this area are set out in Appendix CT-007-000 Section 10. These measures are related to the specification for HS2 trains and track and the design of line-side equipment. In addition, previous works to upgrade the WCML at Handsacre included the provision of noise barriers either side of the railway corridor.
- 5.6.67 The assessment has identified that in the area between Handsacre and Colwich railway sound levels would increase by approximately 2dB, and the vibration dose

²¹ Further information is provided in Volume 5: Appendix SV-001-000.

²² Further information is provided in Volume 5: Appendix SV-001-000.

values by approximately 10% resulting in negligible long term adverse effects at residential properties and communities. At Colwich, where the changes in service pattern and speed are combined with the realignment of the WCML towards residential community to the south, an increase in railway sound levels of less than 3dB and vibration dose values of less than 15% are predicted. These are both long-term negligible adverse effects.

- 5.6.68 Between Lichfield and Handsacre junction railway sound levels would decrease by approximately 4dB, resulting in a minor long term beneficial effect at residential properties and communities along this section of the line.
- 5.6.69 No residual significant operational noise and vibration effects have been identified for the Proposed Scheme between Lichfield and Colwich, save as described in Volume 2: CFA report number 22 and in Volume 5: Appendix SV-004-022.

Traffic and transport

- 5.6.70 An assessment of the traffic and transport impacts for the Handsacre A515 main compound are reported in the Whittington to Handsacre report (CFA22). The other main traffic movements will be associated with the satellite compounds at Armitage Shanks (CT-05-142, G6) and the A51 (CT-05-121, E5 and F5). Due to the limited scope of the works, the number of daily trips to the compounds is expected to be low. The maximum flow is likely to be less than 70 vehicle movements a day to and from the Armitage Shanks compound and under 200 daily vehicle movements associated with the A51 compound. Vehicle movements at individual work sites will occur around the period of the rail possessions to undertake the works; however, the number of movements associated with each site is expected to be low, with movements occurring for one to two days either side of the individual railway possessions.
- 5.6.71 The works to the WCML between Lichfield and Colwich will not require any changes to be made to routes of PRoW, but will occasionally require movement of construction vehicles along access routes that are also PRoW. This is not expected to give rise to any significant environmental effects, due to the small number of movements expected and short duration of the works.
- 5.6.72 The draft CoCP outlines provisions to ensure that traffic and transport impacts are minimised during construction (draft CoCP, Section 14).

Waste and material resources

- 5.6.73 During the modification works, waste and materials management will be dealt with in accordance with the measures set out within the draft CoCP, Section 15. Materials will be required, but quantities are not expected to be substantial due to the limited scope of the construction works. As a result, the quantity of waste arising during the WCML modification works is not expected to be substantial.
- 5.6.74 All waste will be dealt with as required by legislation, subject to the provisions of the hybrid Bill, including the draft CoCP, Section 15, and in accordance with established practice.
- 5.6.75 No significant environmental impacts are likely from waste or in terms of material resources and, therefore, no significant effects are expected to arise.

Water resources and flood risk assessment

- 5.6.76 There are seven watercourses crossed by the WCML modification works (including three that are classified as Main Rivers) and other watercourses, culverts, and tributaries adjacent to the route. Each of these watercourses is identified in Volume 5: Appendix CT-007-000, Section 11.
- 5.6.77 There are eight Water Framework Directive (WFD) surface water catchments and three WFD groundwater formations within the area. The surface water catchments are classified from poor to good status, and the groundwater formations are classified as moderate to high status.
- 5.6.78 There are 67 listed environmental permits for discharge to surface waters within this area and 15 listed surface water abstractions. In addition, there are 16 listed environmental permits for groundwater discharges and 4 listed groundwater abstractions.
- 5.6.79 The Bromsgrove Sandstone Formation and the Kidderminster Formation are designated as Principal aquifers, and the Mercia Mudstone Group is designated as a Secondary B aquifer. Alluvium, Glaciofluvial Sheet Deposits, and River Terrace Deposits are designated as Secondary A aquifers.
- 5.6.80 There are no significant temporary or permanent construction-related or operational impacts to surface water or groundwater resources.
- 5.6.81 All water-dependent habitats and SSSI are located outside of the land required for the Proposed Scheme and will not be affected.
- 5.6.82 Dewatering is not expected to be carried out in the Lichfield to Colwich area; therefore, no ponds and springs have been identified for assessment. However, a permanent access route (near Cawarden Spring Wood) that follows an existing access route, will pass close to four ponds. As it will follow an existing access route, the ponds are unlikely to be affected by the use of the route for construction access.
- 5.6.83 The majority of the route will be subject to either a negligible risk or a low risk of river flooding and, therefore, is unlikely to have a significant effect on flood risk to any off-site receptors. However, the A51 satellite construction compound and nearby relocatable equipment building are within Flood Zones 2 and 3, indicating that these works may be at a moderate to high risk from river flooding from Moreton Brook and the River Trent.
- 5.6.84 The majority of the area is not at risk of surface water flooding and therefore the proposed works will not alter overland flowpaths. However, the existing railway siding at Lichfield (Map CT-05-148, G4 to H4) and a small portion of the Armitage Shanks satellite compound are both at a medium risk of flooding. A temporary crane platform near Lawnmeadow Covert (Map CT-05-143, A6) is at a medium/high risk of surface water flooding, as well as an access route and car park for a new relocatable equipment building adjacent to Colton Road, and the A51 compound (Maps CT-05-145, C6 to D6). Additionally, a new relocatable equipment building in Colwich (Map CT-05-147, D6) will be at a medium/high risk of surface water flooding. Application of the relevant measures in the draft CoCP and the design of appropriate drainage for

both site run-off and any overland flow paths intercepted by the works will mean that the Proposed Scheme will not result in a significant increase in the flood risk to off-site receptors.

- 5.6.85 There are three sewer overflow valves located within the area, but all are located outside the land required for the Proposed Scheme. The Armitage Shanks satellite compound in Handsacre is located over the sewer network and three sewer manholes. The area is considered at a high risk of sewer flooding during the time that the compound will be in use. The existing railway sidings at Lichfield are built over sewer lines. However, it was not built over any surcharge points and hence this area will be at a medium/high risk of sewer flooding. The works will not significantly change the risk to off-site receptors from sewer flooding.
- 5.6.86 In terms of flooding from artificial waterbodies (i.e. reservoirs), the only potential risk would be from Stowe Pool. Due to the robust maintenance and inspection regime that is applied to reservoirs, this risk is considered low. The risk of groundwater flooding is also considered to be low.
- 5.6.87 The design of the WCML works, including mitigation measures and the measures outlined in the draft CoCP, will ensure that construction works are at an acceptable level of flood risk and will not cause increased flood risk elsewhere, including an allowance for climate change.
- 5.6.88 The Proposed Scheme is not significantly different to the existing infrastructure and operation of the lines is subject to controls agreed with the regulators. Therefore, operational impacts are considered negligible.

5.7 Summary of likely residual significant effects

- 5.7.1 Taking into account the mitigation, compensation and enhancement proposed, an anticipated likely residual significant effect would occur during construction in three community areas at Handsacre, Rugeley and Colwich.

6 Heathrow Express depot relocation

6.1 Introduction

- 6.1.1 The current programme for Old Oak Common station in the Proposed Scheme requires the site to be cleared for construction by 2017. This will require the demolition of the HEx depot and the FGW depot, as described within CFA report 4. The Proposed Scheme involves identification of alternative facilities to ensure the continuation of services. The HEx depot relocation is discussed in this section and the relocation of the stabling and maintenance facilities provided at the FGW depot is discussed in Section 7. Potential cumulative effects of the two depot relocations are considered in Section 7.8.
- 6.1.2 The favoured option for the relocation of the HEx depot is the site at the east end of the North Pole site to the east of Scrubs Lane (referred to here as 'the proposed HEx depot'). This site is indicated on Map CT-18 (Volume 4: Off-Route Effects Map Book) and is within the land potentially required during construction of the Proposed Scheme. The proposed HEx depot site is subject to more detailed operational modelling as part of Network Rail's GRIP 3²³ process.
- 6.1.3 The east of the North Pole site is located east of Scrubs Lane in the London Borough of Hammersmith and Fulham (LBHF) and Royal Borough of Kensington and Chelsea (RBKC). It is not currently occupied and was formerly a rail depot. To the south-east there is a mixed residential area consisting of 1930s flats, more modern flats and community facilities including the Dalgarno Community Centre and St. Francis Community Church. Little Wormwood Scrubs Park is directly to the south. There are also industrial units directly to the south at Mitre Bridge Industrial Estate. To the north and west are railway tracks including the Great Western Main Line (GWML). The site is owned by the BRB (Residuary)/London & Continental Railways. The east of the site is identified for residential housing and commercial development in the adopted RBKC Core Strategy (2010)²⁴ and is within the Kensal Canalside Opportunity Area identified by the Greater London Authority (GLA). The west of the site is identified for rail operations by LBHF in the adopted Core Strategy (2011)²⁵.

6.2 Scope, assumptions and limitations

- 6.2.1 A site specific study area has been defined and it is considered that the potential for significant environmental effects is confined within this area. The study area is defined as being bounded to the west by Scrubs Lane, to the north by the Grand Union Canal, to the east by Ladbroke Grove and to the south by Dalgarno Gardens and Barlby Road. This study area is illustrated on Map CT-18 (Volume 4: Off-Route Effects Map Book).
- 6.2.2 Full details of the significance criteria used for assessment and the process for determining significance of effects are provided in the relevant sections of the SMR

²³ Stage 3 (Option Selection) of Network Rail's Governance for Railway Investment Projects process.

²⁴ Kensington and Chelsea Borough Council (2010), *Core Strategy for the Royal Borough of Kensington and Chelsea*.

²⁵ Hammersmith and Fulham Council (2011); *Hammersmith and Fulham Council Core Strategy: Local Development Strategy*.

(see Volume 5: Appendix CT-001-000/1) and SMR Addendum (see Volume 5: CT-001-000/2). The following are the exceptions to general assessment methodologies:

- cultural heritage – due to the relatively minor nature of the works, a site specific study area was defined; and
- sound, noise and vibration – in the absence of baseline noise surveys, a qualitative assessment was made.

6.2.3 The measures contained within the draft CoCP (see Volume 5: Appendix CT-003-000) will be applied during the construction work for the relocated depot. The operation of the relocated depot will be in accordance with rail industry best practice.

6.3 Description of the proposed HEx depot

Overview

6.3.1 The proposed site is currently unoccupied and used to be the London Eurostar depot between 1994 and 2007. The disused depot site currently forms part of a construction site for the IEP, and hence its condition is constantly changing.

6.3.2 Ten tracks approximately 235m in length are required to accommodate the HEx rolling stock. Infrastructure provision in the disused maintenance depot is likely to include:

- refurbishment of the existing maintenance shed;
- 10 sidings to accommodate two trains each;
- a turnback siding will be constructed to allow trains to manoeuvre within the depot;
- a car park and office building;
- access road within the depot boundary;
- a new connection to the depot directly off the Great Western Main Line;
- alterations to overhead line equipment and depot operation signalling; and
- CET and train washing facilities.

6.4 Construction of the proposed HEx depot

6.4.1 This section sets out the strategy for the construction of the proposed HEx depot. A guide to standard construction techniques is provided in Volume 1. Land required for construction of the proposed HEx depot is illustrated on Map CT-18. The proposed HEx depot will be constructed within the existing boundary of the eastern end of North Pole depot.

Overview of the construction process

6.4.2 Building and preparing the depot for operation will comprise the following general stages:

- advance works including: site investigations, preliminary mitigation works and

preliminary enabling works;

- civil engineering works including: establishment of site compound, site preparation and enabling works, main structure works, site restoration and removal of site compound;
- railway installation works including: establishment of site compound, infrastructure installation, connections to utilities, changes to the existing rail network, and removal of site compounds; and
- system testing and commissioning.

Construction programme

6.4.3 The exact construction programme has yet to be confirmed but is likely to be 18 months.

6.5 Operation of the proposed HEx depot

6.5.1 The proposed HEx depot will accommodate up to 19 trains. All trains will be electric units.

6.5.2 Services required at the proposed HEx depot are as follows:

- train stabling;
- train washing;
- CET services;
- maintenance and servicing; and
- staff welfare.

6.5.3 The depot will operate 24 hours a day, seven days a week.

6.6 Depot site main alternatives

6.6.1 Since October 2012, as part of the design development process for Phase One of HS2, a series of local alternatives for depot sites have been reviewed within workshops attended by engineering, planning and environmental specialists. During these workshops, the likely significant environmental effects of each design option were reviewed. The purpose of these reviews has been to ensure that the site draws the right balance between engineering requirements, cost and potential environmental impacts.

6.6.2 Eighteen options were originally considered. Ten of these options were immediately discounted for reasons of cost and/or operability. Eight options were shortlisted and further appraised as follows:

- Reading depot;
- eastern end of North Pole depot (east of Scrubs Lane);
- Langley;

- West Drayton;
- North Pole depot (west of Scrubs Lane);
- Colnbrook;
- West Ealing; and
- Southall east sidings.

6.6.3 The option that ranked highest for accommodating and maintaining the HEx fleet after considering engineering, environmental, operational and cost implications was the eastern end of the North Pole depot site. Key advantages of this site are that it is previously operational railway land used as a train servicing depot, is currently vacant, is the lowest cost option and is located close to the existing depot.

6.6.4 Detailed operational modelling work is on going for the eastern end of North Pole depot site and the two other highest performing sites (Southall east sidings and west Ealing), as part of Network Rail's GRIP 3 process. The relocation will also be subject to reaching an appropriate commercial agreement with the operator. Should it be determined that an available alternative site is more suitable, this will require separate planning permission and a separate environmental impact assessment.

6.7 Overview of environmental effects

6.7.1 This section describes the assessment of the environmental effects of the proposed HEx depot.

6.7.2 Each environmental topic includes a brief description of the environmental baseline, the likely environmental effects arising during the construction and operation of the proposed HEx depot and any proposed mitigation measures. Map CT-18 (Volume 4: Off-route effects Map Book) illustrates the environmental baseline for the area.

6.7.3 Agriculture, forestry and soils have been scoped out of the assessment as there are no agriculture or forestry activities affected by the Proposed Scheme in this urban area.

Air quality

Environmental baseline

6.7.4 The main source of existing air pollution in the area is emissions from road traffic, as is the case for nearly all parts of London. Airborne concentrations of the main pollutants are elevated substantially close to roads where traffic flows are high when compared to the 'urban background', as exemplified by locations near Scrubs Lane. Concentrations are also elevated close to the GWML.

6.7.5 There are residential receptors adjacent to and within 15m of the southern boundary of the proposed HEx depot site at Sutton Way, Dalgarno Way, Sunbeam Crescent, Salters Road and Webb Close.

Effects arising during construction

6.7.6 Impacts from the construction of the proposed HEx depot could arise from dust-generating activities and from emissions from construction traffic. The assessment of

construction impacts has been undertaken for human receptors sensitive to dust and exposure to nitrogen dioxide (NO₂) and particulate matter (PM₁₀).

6.7.7 The assessment has assumed that the general measures detailed in Section 7 of the draft CoCP (Volume 5: Appendix CT-003-000/1) will be implemented. Measures will include:

- contractors being required to manage dust, air pollution, odour and exhaust emissions during construction works;
- inspection and visual monitoring after engagement with the local authorities to assess the effectiveness of the measures taken to control dust and air pollutant emissions;
- cleaning (including watering) of haul routes and designated vehicle waiting areas to suppress dust;
- keeping soil stockpiles away from sensitive receptors and also taking into account the prevailing wind direction relative to sensitive receptors; and
- using enclosures to contain dust emitted from construction activities.

6.7.8 Given the mitigation contained within the draft CoCP, the assessment of impacts arising from dust emissions has concluded that they will be negligible in magnitude and that the effect will not be significant.

6.7.9 The number of construction vehicles is not expected to exceed 50 HGV movements per day in both directions (i.e. a combined total of 25 trips inbound and 25 trips outbound). These changes in traffic flows do not meet the criteria for a quantitative assessment. Given the existing traffic flows on the proposed access routes, negligible impacts are predicted at all receptors for NO₂, PM₁₀ and PM_{2.5}. The effect will not be significant.

Effects arising from operation

6.7.10 Impacts from the operation of the proposed HEx depot relate mainly to changes in the nature of road traffic to the site. Electric trains will use the proposed stabling area and emissions from the operation of trains are expected to be negligible.

6.7.11 The proposed HEx depot is likely to result in a small increase in traffic flows on roads to and from the site due to worker transport and deliveries to the depot. These changes are expected to be small in comparison to existing traffic flows. Air quality effects from changes in traffic are expected to be negligible and are not considered significant.

Community

Environmental baseline

6.7.12 The site is currently disused. To the south-east there is a mixed residential area consisting of flats dating from the 1930s alongside more modern houses, flats and community facilities including the Dalgarno Community Centre and St Francis Community Church.

6.7.13 Directly to the south of the site, the character of the area changes with the presence of Little Wormwood Scrubs park. The park consists of a large open area of amenity

grassland, semi-improved neutral grassland, scrub, scattered trees and woodland. There is an adventure playground on the west side of the park and a smaller children's playground located on the east side. To the north and west the area is dominated by railway infrastructure.

Effects arising during construction

- 6.7.14 No community facilities are directly affected by the construction works and no significant effects are likely.
- 6.7.15 Residential properties directly to the south of the site on Salters Road, Shrewsbury Street and Sunbeam Crescent are predicted to experience the following in-combination effects during construction:
- significant visual effects associated with views of construction activity; and
 - significant noise effects associated with daytime construction activity.
- 6.7.16 The combination of these effects, which will coincide over a period of less than 18 months, will have a major adverse effect on the amenity of residents that is considered to be significant.

Effects arising from operation

- 6.7.17 Residential properties directly to the south of the site on Salters Road, Shrewsbury Street and Sunbeam Crescent are predicted to experience the following in-combination effects during operation:
- significant visual effects associated with lighting levels during 24 hour operation; and
 - significant noise effects.
- 6.7.18 The combination of these effects will have a major adverse effect on the amenity of residents that is considered to be significant.

Cultural heritage

Environmental baseline

- 6.7.19 No designated or non-designated heritage assets are located partially or wholly within the land required to construct the proposed HEx depot.
- 6.7.20 One designated asset (Oxford Gardens Conservation Area) is located approximately 350m from the southern boundary of the proposed HEx depot.

Effects arising during construction

- 6.7.21 No significant effects will occur as a result of temporary impacts on the setting of designated or non-designated heritage assets.
- 6.7.22 There will be no physical impacts on buried archaeological remains or other heritage assets within the land required to construct the depot, as no heritage assets have been identified within the site boundary.

Effects arising from operation

- 6.7.23 There will be no physical impacts on buried archaeological remains or other heritage assets arising from the operation of the proposed HEx depot, as no heritage assets have been identified within the site boundary.
- 6.7.24 There may be views of the depot from Dalgarno Gardens which is within the Oxford Gardens Conservation Area to the south of Little Wormwood Scrubs. Given that the site is separated by the length of Little Wormwood Scrubs and that vegetation screens the existing depot building, this is not considered to be a significant effect.

Ecology

Environmental baseline

- 6.7.25 Desk study of the surrounding area has informed the assessment baseline. Access was not obtained to any of the land required for the Proposed Depot and so no general habitat surveys (Phase 1 habitat survey), or species surveys were undertaken. The assessment has therefore been informed by field survey of nearby areas (largely undertaken from Public Rights of Way (PRoW) including Wormwood Scrubs Park, Little Wormwood Scrubs Park, and Kensal Green and St Mary's Roman Catholic Cemetery).
- 6.7.26 Where data are limited, a precautionary baseline has been built up according to the guidance reported in the SMR Addendum (Volume 5 Appendix CT-001-000/2). This constitutes a 'reasonable worst case' basis for the subsequent assessment.
- 6.7.27 A precautionary approach to the assessment has been adopted to identify the likely significant ecological effects of the Proposed Depot.

Designated sites

- 6.7.28 There are two Local Wildlife Sites (LWS) relevant to the assessment in this area. These are:
- British Rail Western Region Land Grade 2 Site of Borough Importance Grade 2 (SBI.II) - a recognised green corridor linking Little Wormwood Scrubs Park, the Grand Union Canal, Kensal Green Cemetery and the remains of the Kensal Green Gasworks site. There are sections of rough grassland and scrub vegetation at the edges of the railway tracks. The SBI.II is located within the land required for the construction of the Proposed Depot and is of district/borough value; and
 - Little Wormwood Scrubs Park Site of Local Importance (SLI) - the main wildlife interest lies in the northern part of this park which is managed for tall herbs which attract invertebrates and colonised scrub offering a niche for common breeding birds. The grassland also supports field voles. The site is adjacent to the land required for the construction of the Proposed Depot and is of local/parish value.

Protected and/or notable species

- 6.7.29 Desk study records indicate small numbers of common and rarer bat species present in the local area. Bat transect surveys undertaken nearby at Wormwood Scrubs Park

and the Grand Union Canal are reported in CFA 4. Surveys recorded low levels of commuting mainly by common and soprano pipistrelles. Myotis and serotine bats were recorded on only one occasion and just single passes. A single pass of a noctule bat was recorded across Wormwood Scrubs Park.

- 6.7.30 All bats are London Biodiversity Action Plan (BAP)²⁶ and Royal Borough of Kensington and Chelsea²⁷ Local BAP species. Access was not available to carry out initial assessment or further survey and it is not possible to rule out that the depot building may potentially support maternity roosts of common bats such as pipistrelles, or roosts of rarer bats including myotis, serotine and noctule species. Therefore a precautionary value has been applied of up to county/metropolitan value.
- 6.7.31 Bats may forage along the local area of railway land and are likely to be of local/parish value.
- 6.7.32 Field survey in CFA 4 indicates a single black redstart male holding territory was recorded to the west of St Mary's Roman Catholic Cemetery. While no evidence of breeding was recorded, the presence of an individual holding territory represents more than 1% of the national population of this species and the species may be foraging in the railway land. Black redstart is a London BAP and Royal Borough of Kensington and Chelsea Local BAP species. Black redstart are of national value.
- 6.7.33 Desk study records indicate other common breeding and wintering bird species present in the local area may use small areas of habitat suitable in the railway land. Breeding bird assemblages and populations are likely to be of local/parish value.
- 6.7.34 The areas of railway corridor are likely individually of low importance for terrestrial invertebrates but collectively they form a movement corridor and habitat feature likely to be important to invertebrate populations across this area of London. Assemblages of terrestrial invertebrates in this area are likely to be of local/parish value.
- 6.7.35 Records show that grass snake, slow worm and common lizard have been reported in the area. Slow worm (an Ealing Biodiversity Action Plan (BAP)²⁸ species), adder, grass snake and common lizard are a species of principal importance and London BAP priority species, and all common reptiles are a London BAP species. Populations of reptiles are likely to be of local/parish value.

Effects arising during construction

- 6.7.36 The works will result in some temporary and permanent habitat loss from the British Rail Western Region Land SBI.II. The loss of small areas of habitat will result in partial fragmentation of the SBI at the location of the works. However, the majority of habitat connectivity will be retained and therefore the function of the SBI as a corridor habitat will be maintained.

²⁶ London Biodiversity Partnership; London's BAP Priority Species; <http://www.lbp.org.uk/londonpriority.html>; accessed 2.10.13

²⁷ Royal Borough of Kensington and Chelsea; Local Biodiversity Action Plan; http://www.rbkc.gov.uk/pdf/PRINT_LBAP2010_2015_V3_reduced%20PR_SL-%20Appx%202.pdf; accessed 2.10.13

²⁸ London Borough of Ealing; Biodiversity Action Plan; http://www.ealing.gov.uk/info/200588/nature_conservation/630/species_monitoring/2; accessed 2.10.13

- 6.7.37 Mitigation for the temporary loss of British Rail Western Region Land SBI.II will include the re-instatement of the same area of habitats within the extent of the land required temporarily for construction, to the same condition prior to construction of the new depot. It will take approximately five years for this replaced vegetation to become established. This will mitigate the temporary loss of the designated site reducing the effect to a level that is not significant.
- 6.7.38 The removal or disturbance of habitat features that are utilised by bats for foraging and commuting is considered to have the potential to result in adverse effects on the conservation status of assemblages during construction. Such effects will be temporary and there are other habitats retained in the wider area. The restoration and enhancement of habitat will reduce the effect to a level that is not significant.
- 6.7.39 The works will remove small areas of habitat which are suitable for black redstart in the rail land and surrounding light industrial areas. However, there is extensive alternative nesting habitat in the area and the habitat loss is therefore not considered to affect the conservation status of this species. In addition, the draft CoCP includes provision for sensitive timing to conduct habitat clearance outside of the nesting bird season where reasonably practical. The loss of habitat would not result in a significant effect on black redstart.
- 6.7.40 Mitigation for the area of permanent habitat loss for breeding birds, terrestrial invertebrates and common reptiles will include enhancement of retained habitat within the site through the planting of native trees, creation of wildflower grassland areas and the provision of additional features such as log piles to benefit invertebrates, reptiles and birds. This will compensate for the permanent loss of railway habitat reducing the effect to a level that is not significant.
- 6.7.41 The additional measures set out in the draft CoCP will also ensure that there are no significant impacts during construction for breeding birds, terrestrial invertebrates or common reptiles.

Effects arising from operation

- 6.7.42 No significant effects on ecological receptors during operation of the Proposed Depot are anticipated.

Land quality

Environmental baseline

- 6.7.43 Within the study area there are a number of potentially contaminative land uses which may have locally impacted soils or groundwater.
- 6.7.44 To the south of the Grand Union Canal by Mitre bridge, a gasworks existed in the late 19th century. This overlaps the site of the proposed FGW depot. Further east, Kensal Green Gasworks is located adjacent to the Grand Union Canal.
- 6.7.45 Present day potential contamination sources comprise the disused depot and fuel storage tanks and adjacent commercial and light industrial properties, which are present to the south-west.

6.7.46 Any contamination sources within this area are all underlain by the low permeability London Clay. The London Clay is known to provide an effective barrier to ground borne contaminant migration and any contamination present is likely to be localised.

Effects arising during construction

6.7.47 The draft CoCP sets out the measures and standards of work that will be applied to the construction of the proposed HEx depot. Its requirements in relation to work in contaminated areas will ensure the effective management and control of the work. Such requirements include:

- methods to control waste, dust, odour, gases and vapours (draft CoCP, Sections 5, 7, 13 and 15);
- methods to control spillage and prevent contamination of adjacent areas (draft CoCP, Section 5);
- the management of human exposure for both construction workers and people living and working nearby (draft CoCP, Section 11);
- management of any unexpected contamination found during construction (draft CoCP, Section 11);
- storage requirements for hazardous substances such as oil (draft CoCP, Section 16);
- traffic management to ensure that there is a network of designated haul roads to reduce compaction/degradation of soils (draft CoCP, Section 7 and 14); and
- methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (draft CoCP, Section 16).

6.7.48 With the inclusion of the mitigation measures outlined in the draft CoCP, negligible effects are expected in relation to potential land contamination during the construction phase.

6.7.49 The construction site compounds will include the storage of potentially hazardous substances, such as fuels and lubricating oils. The measures outlined in the draft CoCP will effectively manage risks from the storage of such materials.

Effects arising from operation

6.7.50 Maintenance and operation of the proposed HEx depot will be in accordance with environmental legislation and good practice whereby appropriate spillage and pollution response procedures will be established.

6.7.51 The operation of the depot may give rise to minor contamination through leakage of hydraulic or lubricating oils from trains. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

Landscape and visual assessment

Environmental baseline

- 6.7.52 The site lies in the densely developed urban environment of west London. Land uses are predominantly 19th and 20th century housing and open space to the south of the site with railway infrastructure and industrial and commercial estates to the north and west. Open spaces close to the site include Wormwood Scrubs, Little Wormwood Scrubs, Kensal Green Cemetery and St. Mary's Cemetery.
- 6.7.53 Residential receptors have a high sensitivity to change and are located around Sutton Way, Dalgarno Gardens, Sunbeam Crescent, Shrewsbury Street and Salters Road. Existing views across the urban area typically include housing, open space and railway or other transport infrastructure.
- 6.7.54 Recreational receptors also have a high sensitivity to change and include users of Little Wormwood Scrubs Park. Existing views are of trees and open space in the foreground but also include elements of the urban environment such as housing, industrial sites and railway infrastructure.
- 6.7.55 The site is partly within the Wormwood Scrubs Open Space Landscape Character Area (LCA) in the south and Old Oak Common Depot and Surrounding Transport Infrastructure LCA in the north. The LCA adjacent to the site include Kensal Green and St. Mary's cemeteries to the north; North Kensington Residential LCA to the south and east; and Kensal Green Industrial LCA to the north and east.

Effects arising during construction

- 6.7.56 A site visit was undertaken during summer 2013. Visibility of construction activities may be increased when vegetation is not in leaf. However, this has been taken into account in the assessment of visual impacts.
- 6.7.57 The construction works which are likely to give rise to significant effects on landscape and visual receptors are as follows:
- construction of the train wash and CET; and
 - presence of construction plant and construction activity.
- 6.7.58 Measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction include the following:
- appropriate measures to reduce landscape and visual impacts associated with temporary compound offices, vehicles, construction plant and compounds (draft CoCP, Section 12);
 - maximising the retention and protection of existing trees and vegetation where possible (draft CoCP, Section 12);
 - use of well-maintained hoardings and fencing (draft CoCP, Section 5); and
 - designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses (draft CoCP, Section 5).

Landscape assessment

- 6.7.59 Impacts on landscape character will arise from the presence of the construction works and construction plant which will, due to their large scale, introduce prominent, though temporary, new features.
- 6.7.60 Although the LCA have varied sensitivity to change, the scale of the proposed HEx depot during construction will be similar to the existing railway infrastructure and will not affect the overall setting of the LCA within which the site is located or adjacent LCA. The presence of construction activity will temporarily reduce the tranquillity of the Wormwood Scrubs Open Space LCA, the Old Oak Common Depot and Surrounding Transport Infrastructure LCA and surrounding LCA. As the site is already railway land the overall magnitude of change is considered to be low.
- 6.7.61 The low magnitude of change, combined with the low sensitivity to change will result in a minor adverse effect that is not considered significant.

Visual assessment

- 6.7.62 Residential receptors on Sutton Way, Dalgarno Way, Dalgarno Gardens, Sunbeam Crescent, Webb Close and Shrewsbury Street and visual receptors in Little Wormwood Scrubs are likely to have views of part of the construction works. Residential and recreational receptors have a high sensitivity to change.
- 6.7.63 Views from Little Wormwood Scrubs Park will be partially screened by the existing vegetation to the north. Cranes will be apparent above the trees but will be temporary and not an unusual feature in the urban setting. The magnitude of change is considered to be low resulting in a minor adverse effect.
- 6.7.64 Views from residential properties will be largely limited to the properties located immediately adjacent to the existing railway corridor. The views north include gardens and allotments in the foreground and railway infrastructure in the middle ground. The Kensal Green gas holders and cemetery form the background elements. Some views are partially screened by existing trees and scrub along the railway corridor, notably to the north of Sunbeam Crescent and Shrewsbury Street. Any loss of this vegetation will open up views of the construction activity to the north. The magnitude of change is considered to be medium combined with the high sensitivity of the receptor resulting in a moderate adverse effect.
- 6.7.65 Visual screening will be strengthened through the retention of existing vegetation along the southern boundary of the site and possible additional planting.
- 6.7.66 The impact of construction on the residential visual receptors to the south will result in a moderate adverse effect and is considered significant. However, this will be temporary and reversible in nature lasting only for the duration of the construction works.

Effects arising from operation

- 6.7.67 The specific elements of the proposed HEx depot which may give rise to permanent significant effects on landscape and visual receptors are listed as follows:
- the train wash and CET to the east of the site; and

- loss of screening vegetation.

Landscape assessment

- 6.7.68 As there is an existing disused depot on the site and the scale of the development is compatible with this, no significant effects on the Depot and Surrounding Transport Infrastructure LCA, Wormwood Scrubs Open Space LCA or adjacent LCA are predicted during operation of the depot.

Visual assessment

- 6.7.69 The elements of the proposed HEx depot, including the train wash and CET are expected to be of a similar scale to the existing buildings, though located closer to the receptors to the south. The potential loss of screening vegetation will open views to the north and the presence of floodlighting at night will be intrusive.
- 6.7.70 There is no floodlighting on the site at present and the views to the north from the residential properties are relatively dark over the depot, canal and Kensal Green Cemetery. The expected lighting levels resulting from the proposed working hours at the depot will be visually intrusive. The magnitude of change is considered to be medium. Combined with the high sensitivity of the receptor this will result in a moderate adverse effect which is considered significant. Low level directional lighting will be used to reduce this effect, however, it is still considered significant.
- 6.7.71 The loss of existing vegetation adjacent to residential receptors, particularly to the rear of Sunbeam Crescent and Shrewsbury Street, will allow more open views to the north. Views of the proposed HEx depot will include the train wash and CET at a distance of approximately 30m from the nearest receptors. However, these buildings will be similar in appearance and scale to the buildings recently demolished. Overall, the magnitude of change is considered to be low. The low magnitude of change, combined with the high sensitivity of the receptor, will result in a minor adverse effect which is not considered significant.
- 6.7.72 In summer of year 1 of operation, the landscape and visual effects will be unchanged. By year 15 and beyond to year 60 of operation, growth of existing planting will soften the appearance of the view north.

Socio-economics

- 6.7.73 Apart from HEx, no existing businesses are affected by the proposed HEx depot.
- 6.7.74 As the HEx depot is already operational and is being relocated, it is assumed that no jobs will be lost or additional jobs will be created during operation. A small number of jobs will be created during construction, and while positive, will not result in a significant effect.

Sound, noise and vibration

- 6.7.75 A qualitative assessment has considered likely effects resulting from noise or vibration associated with construction and operation of the Proposed Scheme on a worst case basis.

Environmental baseline

- 6.7.76 The site of the proposed depot is currently occupied by railway infrastructure. To the south east of the proposed depot there is a primarily residential area. Potentially affected residential receptors are located around Sutton Way, Webb Close, Dalgarno Way, Sunbeam Crescent, Shrewsbury Street, Salters Road, and Barlby Gardens. A number of residential properties are 15m from the boundary of the depot. There is currently a chain link fence at the boundary next to the properties that will provide no noise screening.
- 6.7.77 The existing acoustic character of the area is typical for a busy urban location being dominated by continuous sound from distant road traffic and trains regularly passing on the adjacent Great Western railway. Regular but variable sound events both day and night from local road traffic, trains (including freight on the Great Western Line) and community activity also shapes the sound environment in the area.

Effects arising during construction

- 6.7.78 The construction works will primarily be construction of a new carriage wash building and changes to the railway track layouts, including connections to the existing railway infrastructure.
- 6.7.79 It is assumed that the majority of the works will be undertaken during normal daytime working hours. However, the connections to the existing railway infrastructure and potentially other short term works will need to be carried out in possession, so it is likely that these works will be undertaken during the night time or at weekends. It is expected that the noise effects arising from the night-time works would be limited in duration, so they are considered not to be significant.
- 6.7.80 The draft CoCP sets out the measures proposed to reduce and control construction noise and vibration. The principal is the application of best practicable means (BPM) to minimise noise (such as the reduction of sound levels at source through the choice of plant and working methods, the control of working hours, the use of localised screening etc.). The draft CoCP also provides:
- a noise insulation and temporary re-housing policy where, despite BPM, noise levels cannot be reduced below defined thresholds,
 - a commitment to monitoring;
 - a commitment to seek prior consent for the construction method; and
 - steps to minimise noise under section 61 of the Control of Pollution Act.
- 6.7.81 Given the proximity of residential receptors to the construction of the train wash, CET and track works it is likely, on a worst case basis, there will be adverse noise effects on the closest residential receptors. Given the number of likely affected receptors close to the works, this is considered significant on a residential community basis.
- 6.7.82 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the measures.

The outcome of these activities will be reflected in the Environmental Minimum Requirements.

- 6.7.83 The levels of additional traffic during construction activity are unlikely to result in significant indirect noise effects given that the volume of construction traffic is small compared the existing traffic flows.

Effects arising from operation

- 6.7.84 The proposed operational use of the depot is for the stabling, cleaning and maintenance of trains when they are not in passenger service. The depot is proposed to have facilities for 19 trains and would operate 24 hours a day, seven days a week. Trains will generally return to the depot shortly after the end of the service day around midnight, and will then leave the depot ahead of the start of the next service day, around 05:00.
- 6.7.85 Sources of potentially significant noise include: sounding of train horns; train movements particularly over tightly curved tracks causing wheel squeal; on-train equipment such as heating, ventilation and air-conditioning (HVAC) units that operate while vehicles are stabled²⁹; train maintenance; train washing; and train cleaning.
- 6.7.86 Maintenance will be undertaken inside a building that will insulate nearby sensitive receptors from noise generated by these activities. It is assumed that this will also include fixed plant for the servicing of the CET equipment.
- 6.7.87 It is assumed that the new carriage wash equipment will be enclosed and that this will provide some insulation for nearby sensitive receptors.
- 6.7.88 Significant noise effects from the operational static sources such as mechanical ventilation at maintenance shed and line-side equipment will be avoided through their design and the specification of noise emission limits (for further information please see Volume 5: Appendix SV-001-000).
- 6.7.89 Taking account of mitigation measures, on a worst case basis, it is likely that the operation of the depot will give rise to adverse noise effects (noise increases) and these are considered significant given the large number of dwellings that would be subject to the effects.
- 6.7.90 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the measures. The outcome of these activities will be reflected in the Environmental Minimum Requirements.
- 6.7.91 Operational road traffic is unlikely to result in significant indirect noise effects along existing roads from the small number vehicles accessing and leaving the depot.
- 6.7.92 Trains entering and leaving the depot are unlikely to cause significant indirect noise effects as they will result in a small increase in the number of train movements on the existing lines and the HEx trains are modern, electric multiple units.

²⁹ particularly for periods after trains arrive at the depot or before they leave to return to service

Traffic and transport

Environmental baseline

- 6.7.93 The site is located approximately 1.2 km north of the A40. The main local roads affected by the proposed HEx depot are Scrubs Lane, Dalgarno Gardens, Mitre Way, Ladbroke Grove and Barlby Road. There are two access points to the site, Mitre Way and Barlby Road. The connection to the A40 via Scrubs Lane or Ladbroke Grove offers the most direct route to and from the site.

Effects arising during construction

- 6.7.94 The temporary traffic and transport impacts within this study area are associated with construction vehicle movements. Construction vehicle movements required to construct the proposed HEx depot include the delivery of plant and materials and construction worker trips.
- 6.7.95 Levels of traffic generated by construction activities throughout the construction period are expected to be small in comparison to existing traffic flows and no traffic rerouting is anticipated. Changes resulting from additional construction traffic are not considered significant.

Effects arising from operation

- 6.7.96 The proposed HEx depot is anticipated to result in a small increase in traffic flows on roads to and from the site due to worker transport and deliveries to the depot. These changes are expected to be small in comparison to existing traffic flows and are not considered significant.

Waste and material resources

- 6.7.97 The construction of a new depot facility on the site will result in the generation of a small amount of construction waste. As with the construction waste from the Proposed Scheme, it is estimated that 90% of this waste will be reused, recycled and recovered (i.e. diverted from landfill) based on the landfill diversion performance of similar projects.
- 6.7.98 Due to the small quantity of waste that will be generated and expected high diversion rate it is assessed that there will be no significant effects associated with the management of this waste.
- 6.7.99 The HEx depot is already operational and the relocated depot is not expected to give rise to significant quantities of additional operational waste. No significant environmental effects are likely to arise from the management of operational waste.

Water resources and flood risk assessment

Environmental baseline

- 6.7.100 The area lies within the Thames River Basin District and is covered by the associated river basin management plan (RBMP). There are no surface water features within the site. There are no licensed or unlicensed surface water abstractions within the site. The site area is within Flood Zone 1 and has no history of flooding. The Grand Union Canal runs to the north of the study area and is separated from the site by railway infrastructure including the GWML.

Effects arising during construction

- 6.7.101 No significant temporary or permanent effects on surface water or groundwater features have been identified during the construction period.

Effects arising from operation

- 6.7.102 No significant temporary or permanent effects on surface water or groundwater features have been identified during the operational period.

6.8 Summary of likely significant residual effects

- 6.8.1 This assessment has identified the potential for significant noise effects to occur during the construction and operation phase due to the proximity of residential receptors to elements of the depot that will be built close to the southern boundary of the site.
- 6.8.2 The likely significant effects on visual receptors during construction have been identified. However, this will be temporary and reversible in nature lasting only for the duration of the construction works.
- 6.8.3 During operation, the proposed working hours at the depot and expected lighting levels are likely to result in a moderate adverse effect on visual receptors which is considered significant. Further work will be undertaken during detailed design to reduce this effect.
- 6.8.4 During construction and operation, a significant effect on the amenity of residents directly to the south of the site is likely due to noise and visual impacts.

7 First Great Western depot relocation

7.1 Introduction

- 7.1.1 The programme for Old Oak Common station requires the site to be cleared for construction by early 2017. This will require the demolition of the First Great Western (FGW) depot and the Heathrow Express (HEX) depot as described in the CFA 4. HS2 Ltd is committed to identifying alternative stabling and maintenance facilities to ensure the continuation of services. The relocation of the stabling and maintenance facilities provided at the FGW depot is discussed in this Section and the relocation of the HEX depot is discussed in Volume 4, Section 6. Potential cumulative effects of the two depot relocations are considered in Section 7.8.
- 7.1.2 The FGW depot houses rolling stock used on the Great Western Main Line (GWML). Stabling and maintenance facilities will be relocated as part of the Proposed Scheme; the proposal is to use part of the western end of the redeveloped North Pole depot (west of Scrubs Lane) (referred to here as 'the proposed FGW depot'). The North Pole depot was the London Eurostar depot between 1994 and 2007 and the western end, west of Scrubs Lane, is currently being redeveloped for the IEP. This site is indicated on Map CT-18 (Volume 4: Off-Route Effects Map Book).
- 7.1.3 The western end of the North Pole depot lies in the south of the Old Oak Common station site within the London Borough of Hammersmith and Fulham (LBHF). To the south of the site lies Wormwood Scrubs open space and to the south-west, the East Acton Industrial Estate. To the north, there is existing railway infrastructure and the Old Oak Common depot and to the east and west further railway infrastructure.

7.2 Scope, assumptions and limitations

- 7.2.1 A site specific study area has been defined and it is considered that the potential for likely significant environmental effects is confined within this area. The study area is defined as being bounded to the north by the Grand Union Canal, to the south by Wormwood Scrubs Park, to the west by Wells House Road and to the east by the eastern end of North Pole depot. The baseline environment is illustrated on Map CT-18 (Volume 4: Off-Route Effects Map Book).
- 7.2.2 Full details of the significance criteria used for assessment and the process for determining significance of effects are provided in the relevant sections of the SMR (Volume 5: Appendix CT-001-000/1) and Scope and Methodology Report Addendum (Volume 5: Appendix CT-001-000/2). The following are the exceptions to general assessment methodologies:
- cultural heritage – due to the relatively minor nature of the works, a site specific study area was defined; and
 - sound, noise and vibration – in the absence of baseline noise surveys, a qualitative assessment was made.

7.3 Description of the proposed FGW depot

Overview

- 7.3.1 The western end of the North Pole depot will be used as the London depot on the GWML for the IEP fleet, following its introduction. The depot is currently being developed by Hitachi. The IEP involves replacing the FGW fleet with hybrid (diesel-electric) trains. Consent for redevelopment of the North Pole depot for use by the IEP has been obtained separately by Hitachi.
- 7.3.2 The proposed closure of the FGW depot will see the existing FGW trains which are currently stabled and maintained at Old Oak Common transfer to the western end of the North Pole depot alongside the IEP fleet.
- 7.3.3 The assessment assumes stabling for around 20 to 25 FGW trains (consisting of a small number of HST's, a number of diesel commuter trains & up to 3 diesel locomotives) will be required. FGW trains will remain at the FGW depot until the depot is demolished, during which time some trains may have been replaced by IEP rolling stock, therefore this number is likely to be lower. By 2018, this requirement is anticipated be reduced to around 9 trains as the majority of the existing FGW HST fleet will have been replaced by the IEP fleet and the majority of the diesel commuter fleet may have been replaced by electric commuter trains.
- 7.3.4 The assumptions with respect to stabling requirements may be subject to change, given variables including the exact timing of the electrification of the GWML, which is currently expected to be completed around December 2016.
- 7.3.5 The introduction of IEP means trains stabled at the FGW depot will be progressively taken out of service. Demolition of the FGW depot is accelerating a transfer that was already required.

7.4 Construction of the proposed FGW depot

- 7.4.1 No material alterations to the structure will be required to accommodate the residual FGW rolling stock, as facilities will be included when it is redeveloped for the IEP fleet. It is expected to open in 2015. As such, there will be no effects during construction and these are not considered further.

Land required for the proposed FGW depot

- 7.4.2 No additional land is required on a permanent basis.

7.5 Operation of the proposed FGW depot

- 7.5.1 The depot will accommodate up to 26 relocated FGW trains for the period 2015-2018. From March 2017, the majority of existing FGW diesel stock will gradually be withdrawn from service on the GWML and replaced by IEP rolling stock.
- 7.5.2 The depot will operate 24 hours a day, seven days a week.
- 7.5.3 Services required for FGW trains at the proposed HEx depot are as follows:
- train stabling;

- train washing;
- fuelling;
- CET services;
- servicing and maintenance; and
- staff accommodation.

7.6 Depot site main alternatives

7.6.1 Since October 2012, as part of the design development process for Phase One of HS2, a series of local alternatives for depot sites have been reviewed within workshops attended by engineering, planning and environmental specialists. During these workshops, the likely significant environmental effects of each design option were reviewed. The purpose of these reviews has been to ensure that the proposed FGW depot draws the right balance between engineering requirements, cost and potential environmental impacts.

7.6.2 Eighteen options were originally considered. Eight of these options were immediately discounted for reasons of cost and/or operability. Ten options were shortlisted and further appraised as follows:

- North Pole depot (west of Scrubs Lane);
- Crossrail depot;
- Reading depot;
- east end of North Pole (east of Scrubs Lane);
- west Drayton;
- Langley;
- Southall south-east sidings;
- Southall north-west sidings;
- Colnbrook; and
- west Ealing.

7.6.3 The option that ranked highest for accommodating and maintaining the FGW fleet after considering engineering, environmental, operational and cost implications was the North Pole site. Key advantages of this site are that it will be an operational depot by the time FGW require to relocate and it is situated close to the existing FGW depot. The North Pole site is the only option to be taken forward to Network Rail's GRIP 3 process.

7.7 Overview of environmental effects

7.7.1 This section describes the assessment of the environmental effects of the proposed FGW depot.

- 7.7.2 Each environmental topic includes a brief description of the environmental baseline, the likely environmental effects arising during operation of the proposed FGW depot and any proposed mitigation measures. Map CT-18 illustrates the environmental baseline for the area.

Air quality

Environmental baseline

- 7.7.3 The main source of existing air pollution in the area is emissions from road traffic, as is the case for nearly all parts of London. Airborne concentrations of the main pollutants are elevated substantially close to roads where traffic flows are high when compared to the 'urban background', as exemplified by locations near Scrubs Lane. Concentrations are also elevated close to rail infrastructure carrying diesel trains in this area.

Effects arising from operation

- 7.7.4 The closest residential receptors are approximately 350m to the west of the depot at Wells House Road. FGW rolling stock is currently stabled approximately 100m to the north-east of Wells House Road in the Old Oak Common depot. The number of diesel trains making up the FGW fleet and requiring stabling in the Old Oak Common area will decrease with the introduction of the IEP. Given these considerations, the impact of the FGW depot on baseline air quality at residential receptors on Wells House Road is likely to decrease, as the distance between receptors and the FGW depot increases and the majority of diesel units are phased out. This is not considered a significant effect.

Community

Environmental baseline

- 7.7.5 The site has housed an operational depot in the past and will be redeveloped as a depot by the time FGW trains are relocated. Potential community receptors to the south include Wormwood Scrubs open space. The closest residential receptors are approximately 350m to the west of the depot at Wells House Road.

Effects arising from operation

- 7.7.6 No impacts on community facilities or amenity have been identified and there will be no significant effects.

Cultural heritage

Environmental baseline

- 7.7.7 No designated heritage assets have been identified partially or wholly within the land required for operation of the proposed FGW depot and no designated assets have been identified in the study area

- 7.7.8 The following non-designated heritage assets have been identified partially or wholly within the land required for operation of the proposed FGW depot:

- North Pole British Rail Depot (KIL 024, Volume 5: Appendix CH-002-004); and
- Old Oak Holt (KIL 106, Volume 5: Appendix CH-002-004).

Effects arising from operation

- 7.7.9 The proposed FGW depot will involve the use of the refurbished IEP depot building and railway infrastructure and no additional effects on the setting of designated or non-designated heritage assets have been identified.
- 7.7.10 There will be no physical impacts on buried archaeological remains or other designated or non-designated heritage assets arising from the operation of the proposed FGW depot.

Ecology

Environmental baseline

- 7.7.11 There are no designated wildlife sites within the land required for the proposed FGW depot. Wormwood Scrubs Grade 1 Site of Borough Interest (SBI:I) is directly to the south of the site.

Effects arising from operation

- 7.7.12 The site is an existing depot and no significant effects associated with the use of the depot by FGW rolling stock have been identified.

Land quality

Environmental baseline

- 7.7.13 There are a number of potentially contaminative land uses which may have impacted soils or groundwater (at least locally) within the study area.
- 7.7.14 The Old Oak Common area has been occupied by railway maintenance facility since approximately 1906.
- 7.7.15 Present day potential contamination sources comprise the redevelopment of the North Pole depot and fuel storage tanks and surrounding commercial and light industrial properties, which are present to the south-west.
- 7.7.16 Past site investigations in the Old Oak Common area indicate the proposed FGW depot is underlain by contaminated soils consistent with long use as a rail depot. The area is underlain by the low permeability London Clay. The London Clay is known to provide an effective barrier to ground borne contaminant migration and any contamination present is likely to be localised.

Effects arising from operation

- 7.7.17 Maintenance and operation of the proposed FGW depot will be in accordance with environmental legislation and good practice whereby appropriate spillage and pollution response procedures will be established.
- 7.7.18 The operation of the depot may give rise to minor contamination through leakage of hydraulic or lubricating oils from trains and during fuelling activities. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

Landscape and visual assessment

Environmental baseline

- 7.7.19 The site lies in the densely developed urban environment of west London. Land uses are predominantly 19th and 20th century housing, with the Wormwood Scrubs open space to the south of the site and railway infrastructure and industrial and commercial estates to the north and west.
- 7.7.20 The closest residential receptors are located approximately 350m to the west on Wells House Road. Existing views across the urban area typically include housing, open space and railway or other transport infrastructure.

Effects arising from operation

- 7.7.21 The proposed FGW depot involves the use of buildings and rail infrastructure developed for the IEP.
- 7.7.22 FGW trains may be visible at the IEP depot in addition to IEP rolling stock. No significant landscape or visual effects are likely during operation.

Socio-economics

- 7.7.23 No businesses affected by the proposed relocation have been identified.
- 7.7.24 As the FGW depot already exists and is being relocated, it is assumed that the number of jobs during operation will be similar and no additional jobs will be created during operation.

Sound, noise and vibration

Environmental Baseline

- 7.7.25 The site is located close to the existing HEx depot and GWML which represent existing noise sources. The closest residential receptors are approximately 350m to the west at Wells House Road and the background noise at these receptors includes existing rail operations and road traffic.

Effects arising from operation

- 7.7.26 The existing sound environment of the area is typical for an urban location. It already features regular but variable sound events both day and night from local road traffic, trains and aircraft, as well as continuous sound from distant road traffic. It is anticipated that any increase in sound, noise and vibration effects resulting from the use of the North Pole depot by FGW rolling stock will be negligible and will not be significant.

Traffic and transport

Environmental baseline

- 7.7.27 The site is located approximately 1.2 km north of the A40. Vehicle access to the site will be via existing arrangements at Mitre Way, off the A219. The connection to the A40 via Scrubs Lane offers the most direct route to and from the site. Pedestrian access is available from Old Oak Common Lane.

Effects arising from operation

- 7.7.28 The proposed FGW depot is anticipated to result in a small increase in traffic flows on roads to and from the site due to worker transport to the depot. These changes are expected to be small in comparison to existing traffic flows and are not considered significant.

Waste and material resources

- 7.7.29 The FGW depot is already operational and the relocation is not expected to give rise to significant quantities of additional operational waste. No significant environmental effects are likely to arise from the management of operational waste.

Water resources and flood risk assessment

Environmental baseline

- 7.7.30 The area lies within the Thames River Basin District (RBD) and is covered by the associated river basin management plan (RBMP). There are no licensed or unlicensed surface water abstractions within the site. The site area is within Flood Zone 1 and was flooded on 20 July 2007 due to prolonged heavy rainfall. The Grand Union Canal (Paddington branch) runs to the north of the study area and is separated from the site by railway infrastructure including the GWML.

Effects arising from operation

- 7.7.31 The site has significant existing drainage infrastructure which will be used during operation of the depot. No significant temporary or permanent effects on surface water or groundwater features are likely during site operation.

7.8 Cumulative effects

- 7.8.1 This section considers the potential for significant cumulative effects resulting from the operation of the west end of the North Pole depot to be used by IEP and FGW units and operation of the east end of the North Pole depot to be used by HEx units. Cumulative construction effects are not considered likely as the refurbishment of the west end of the North Pole depot for use by the IEP and FGW will be complete before the construction of the relocated HEx depot begins.
- 7.8.2 The activities that have the potential to give rise to significant cumulative effects are as follows:
- operational lighting at both depots;
 - operational sound, noise and vibration resulting from maintenance activities at both depots;
 - operational sound, noise and vibration resulting from train movements into, out of and within both depots; and
 - sound, noise and vibration resulting from the operation of the IEP/FGW depot and construction of the HEx depot.

- 7.8.3 No residential receptors have been identified that will have views of both depots, therefore there will be no significant cumulative visual effects, including those resulting from operational lighting.
- 7.8.4 The sheds at the East End of North Pole depot and the North Pole depot are approximately 550m apart. The residential receptor that lies closest to both depots is Sutton Way, which is directly south of the proposed HEx depot and approximately 1km east of the proposed IEP/FGW depot. Given this distance, it is considered unlikely that there will be significant cumulative noise effects resulting from the operation of both depots or during construction of the HEx depot and the operation of the IEP/FGW depot.
- 7.8.5 Trains accessing both depots will leave the GWML north of the East of North Pole depot. There is likely to be an increase in the number of trains using tracks to the north of Dalgarno Way, Sutton Way, Sunbeam Crescent, Shrewsbury Street, Salters Road and Webb Close to access the depots. The distance from residential receptors is approximately 90m. Given this distance, and the noise levels expected, significant cumulative noise effects are not considered likely. Further noise modelling will be undertaken once the exact track layout is known and, if necessary, mitigation designed to reduce any effects experienced by residential receptors. Mitigation measures that can be applied include:
- noise insulation at qualifying receptors; and
 - noise barriers along the southern boundary of the site to reduce noise from train movements.
- 7.8.6 Operational vibration effects are unlikely as the rolling stock will be kept in good condition, train speeds will be low and there is no proposed freight use for the new depot.

7.9 Summary of likely significant residual effects

- 7.9.1 No significant environmental effects have been identified from the operation of the replacement stabling and maintenance facilities for the relocated FGW fleet. No significant cumulative effects have been identified from the operation of the relocated HEx depot and the IEP/FGW depot.

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