# LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

## Volume 2 | Community Forum Area report

CFA21 | Drayton Bassett, Hints and Weeford

November 2013

VOL 2

ES 3.2.1.21

# LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

## Volume 2 | Community Forum Area report

CFA21 | Drayton Bassett, Hints and Weeford

November 2013

ES 3.2.1.21

Department for Transport

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

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

ARUP ATKINS CAPITA ERM

ineco Mott MacDonald PARSONS BRINCKERHOFF TEMPLE URS

High Speed Two (HS2) Limited,
Eland House,
Bressenden Place,
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk



recycle

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

# Contents

**Structure of the HS2 Phase One Environmental Statement** v

**1 Introduction** 1

1.1 Introduction to HS2 1
1.2 Purpose of this report 3
1.3 Structure of this report 3

**2 Overview of the area and description of the Proposed Scheme** 5

2.1 Overview of the area 5
2.2 Description of the Proposed Scheme 10
2.3 Construction of the Proposed Scheme 13
2.4 Operation of the Proposed Scheme 33
2.5 Community forum engagement 34
2.6 Route section main alternatives 36

**3 Agriculture, forestry and soils** 39

3.1 Introduction 39
3.2 Scope, assumptions and limitations 39
3.3 Environmental baseline 40
3.4 Effects arising during construction 47
3.5 Effects arising from operation 56

**4 Air quality** 57

4.1 Introduction 57
4.2 Scope, assumptions and limitations 57
4.3 Environmental baseline 58
4.4 Effects arising during construction 60
4.5 Effects arising from operation 62

**5 Community** 65

5.1 Introduction 65
5.2 Scope, assumptions and limitations 65
5.3 Environmental baseline 66
5.4 Effects arising during construction 69

5.5 Effects arising from operation 77
**6 Cultural heritage 79**
6.1 Introduction 79
6.2 Scope, assumptions and limitations 79
6.3 Environmental baseline 80
6.4 Effects arising during construction 85
6.5 Effects arising from operation 90
**7 Ecology 93**
7.1 Introduction 93
7.2 Scope, assumptions and limitations 93
7.3 Environmental baseline 94
7.4 Effects arising during construction 111
7.5 Effects arising from operation 121
**8 Land quality 125**
8.1 Introduction 125
8.2 Scope, assumptions and limitations 126
8.3 Environmental baseline 126
8.4 Effects arising during construction 130
8.5 Effects arising from operation 138
**9 Landscape and visual assessment 139**
9.1 Introduction 139
9.2 Scope, assumptions and limitations 139
9.3 Environmental baseline 140
9.4 Temporary effects arising during construction 143
9.5 Permanent effects arising during operation 160
**10 Socio-economics 181**
10.1 Introduction 181
10.2 Scope, assumptions and limitations 181
10.3 Environmental baseline 182
10.4 Effects arising during construction 184
10.5 Effects arising during operation 186
**11 Sound, noise and vibration 189**
11.1 Introduction 189
11.2 Environmental baseline 190
11.3 Effects arising during construction 192
11.4 Effects arising during operation 195
**12 Traffic and transport 199**
12.1 Introduction 199
12.2 Scope, assumptions and limitations 199
12.3 Environmental baseline 199

12.4 Effects arising during construction 201
12.5 Effects arising from operation 208
**13 Water resources and flood risk assessment 211**
13.1 Introduction 211
13.2 Scope, assumptions and limitations 212
13.3 Environmental baseline 213
13.4 Effects arising during construction 222
13.5 Effects arising from operation 227
**14 References 229**

## List of figures

Figure 1: HS2 Phase One route and community forum areas 2
Figure 2: Area context map 7
Figure 3: Schematic of construction compounds for civil engineering works 17
Figure 4: Schematic of construction compounds for railway installation works 18
Figure 5: Indicative construction programme for CFA21 28
Figure 6: Business sector composition in Lichfield District Council and West Midlands 182
Figure 7: Employment by industrial sector in Lichfield District Council and West Midlands 183

## List of tables

Table 1: Demolition works for the portion of CFA21 managed from the A4097 Kingsbury Road overbridge main compound (up to Hints Footpath 9) 19
Table 2: Satellite construction compounds managed by the A4097 Kingsbury Road overbridge main compound 21
Table 3: Demolition works for CFA21 managed by the A4097 Kingsbury Road overbridge main compound (from Brockhurst Lane to the A51 Tamworth Road) 22
Table 4: Satellite construction compounds managed by Cappers Lane main compound 24
Table 5: Location of construction compounds managed by the Kingsbury Road railhead 26
Table 6: Estimated construction demolition and excavation waste 27
Table 7: Operational waste forecast for the Proposed Scheme 34
Table 8: Summary characteristics of holdings 45
Table 9: Agricultural land required for the construction of the Proposed Scheme 49
Table 10: Summary of temporary construction effects on holdings 51
Table 11: Agricultural and forestry land required permanently 53
Table 12: Summary of permanent effects on holdings from construction 54
Table 13: Protected and/or notable species 99
Table 14: Summary of sensitive receptors 129
Table 15: Summary of baseline CSM* for sites which may pose a contaminative risk for the Proposed Scheme 133
Table 16: Summary of temporary (construction) effects 134
Table 17: Summary of permanent (post-construction) effects 135
Table 18: Summary of temporary effects for mining and mineral resources 136
Table 19: Summary of effects for mining and mineral resources 137
Table 20: Train flows and speeds 195

Table 21: Likely significant noise or vibration effects on non-residential receptors arising from operation of the Proposed Scheme 198
Table 22: Typical vehicle trip generation for construction site compounds in this area 203
Table 23: Surface water features potentially affected by the Proposed Scheme 214
Table 24: Summary of geology and hydrogeology in CFA21 215

# 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: CFA reports and map books – 26 reports and associated map books providing a description of the Proposed 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.

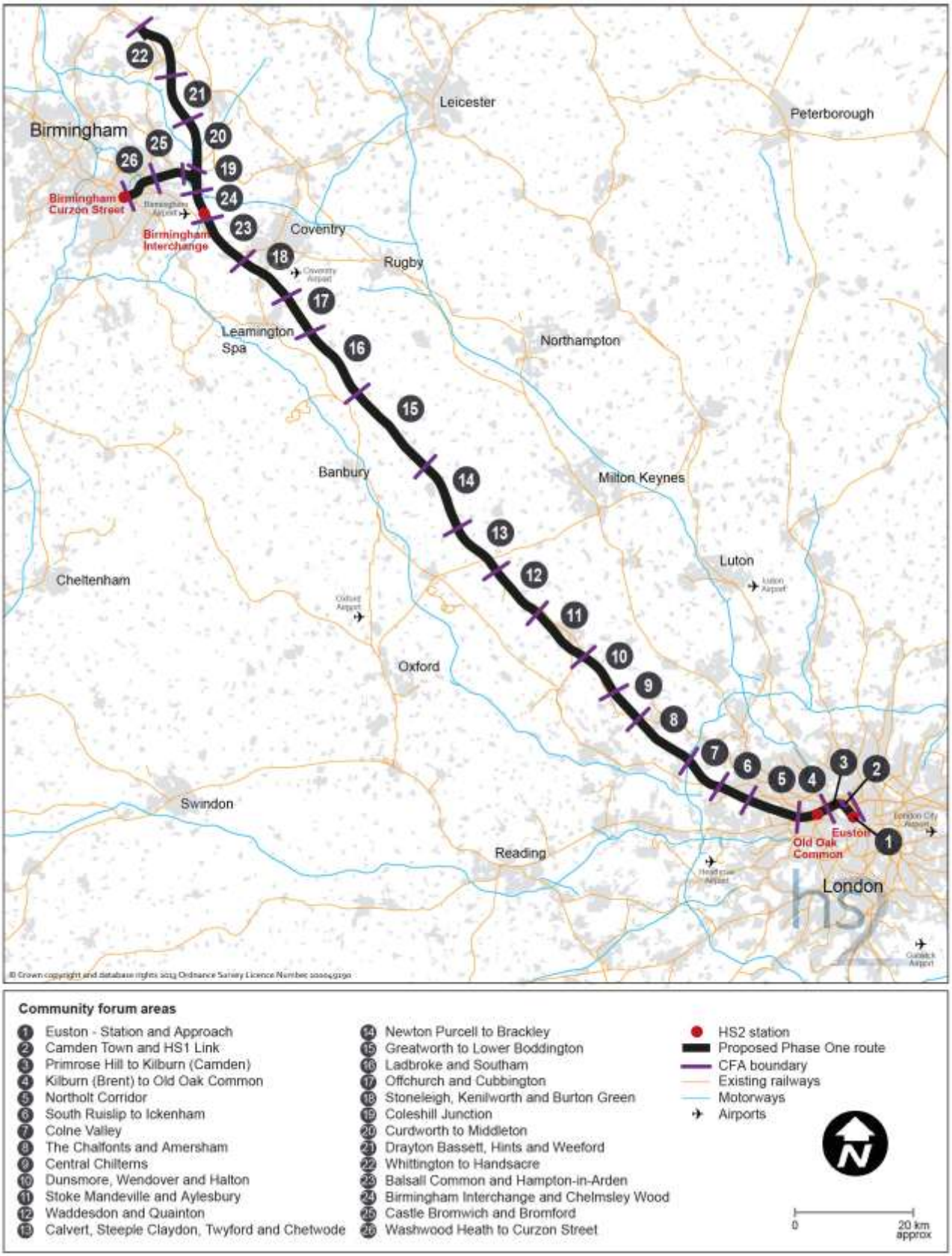
1.1.4 Phase Two will involve the construction of lines from Birmingham to Leeds and Manchester; with construction commencing approximately 2023, and planned to be operational by 2033.

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. For further detail of the anticipated operation of the Proposed Scheme in the Drayton Bassett, Hints and Weeford (CFA21), see Section 2.4.

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), as shown in Figure 1. This has enabled wider public engagement on the Proposed Scheme design and on the likely adverse and beneficial effects.

Figure 1: HS2 Phase One route and community forum areas



## 1.2 Purpose of this report

1.2.1 This CFA report presents the likely significant effects of the construction and operation of the Proposed Scheme on the environment within CFA21 (Drayton Bassett, Hints and Weeford). The report describes the mitigation measures that are proposed for the purpose of avoiding, reducing or managing the likely significant adverse effects of the Proposed Scheme on the environment within CFA21.

## 1.3 Structure of this report

1.3.1 This report is divided into the following sections:

- Section 1 – an introduction to HS2 and the purpose and structure of this report;
- Section 2 – overview of the area, description of the Proposed Scheme within the area and its construction and operation, and a description of the main local alternatives;
- Sections 3-13 – a summary of the assessment for the following environmental topics:
  - Agriculture, forestry and soils (Section 3);
  - Air quality (Section 4);
  - Community (Section 5);
  - Cultural heritage (Section 6);
  - Ecology (Section 7);
  - Land quality (Section 8);
  - Landscape and visual assessment (Section 9);
  - Socio-economics (Section 10);
  - Sound, noise and vibration (Section 11);
  - Traffic and transport (Section 12); and
  - Water resources and flood risk assessment (Section 13).

1.3.2 Each environmental topic section comprises: an introduction to the topic; a description of the environmental baseline within the area; the likely environmental effects arising during construction and operation of the Proposed Scheme; and proposed mitigation measures.

1.3.3 Environmental effects have been assessed in accordance with the methodology set out in Volume 1, as well as the Scope and methodology report (SMR) and SMR Addendum in Volume 5: Appendices CT-001-000/1 and CT-001-000/2.

1.3.4 Where appropriate, potential climate change impacts and adaptation measures are discussed in the relevant environmental topic section. Volume 1 and the SMR

Addendum in Volume 5 also include additional information about climate change adaptation and resilience.

1.3.5 The maps relevant to the Drayton Bassett, Hints and Weeford area are provided in a separate corresponding document entitled Volume 2: CFA21 Map Book, which should be read in conjunction with this report.

1.3.6 The Proposed Scheme described in this report is that shown on the Map Series CT-05 (construction) (Volume 2: CFA21 Map Book) and CT-06 (operation) (Volume 2: CFA21 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and other details within the limits shown on the plans and sections submitted to Parliament and as set out in the Bill, and this flexibility is included within the scope of the environmental assessment. Further explanation is provided in Volume 1, Section 1.3.

1.3.7 In addition to the environmental topics covered in Sections 3-13 of this report, electromagnetic interference is addressed in Volume 1 and climate (greenhouse gas emissions and carbon), and waste and material resources are addressed in Volume 3. An assessment of potential environmental effects beyond the CFA has also been undertaken and this 'off-route' assessment is reported in Volume 4.

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

## 2.1 Overview of the area

2.1.1 The Drayton Bassett, Hints and Weeford area covers an approximately 9.1km section of the Proposed Scheme in the District of Lichfield, Staffordshire, where it passes through the countryside between Sutton Coldfield and Tamworth. The City of Lichfield is situated to the north-west of the area. The area follows the route from the boundary between Warwickshire and Staffordshire in the south to its crossing of the A51 Tamworth Road at Whittington Heath in the north, and includes land within the parishes of Drayton Bassett, Hints, Canwell, Weeford, and Swinfen and Packington.

2.1.2 As shown in Figure 2, the area sits between the neighbouring areas of Curdworth to Middleton (CFA20) to the south and Whittington to Handsacre (CFA22) to the north. For the purposes of this ES, properties fronting the A51 south of the junction with Jerry's Lane and Common Lane at Whittington Heath are taken to fall within this area rather than the Whittington to Handsacre area (CFA22).

### Settlement, land use and topography

2.1.3 The area is predominantly rural in character, with three small villages and a scattering of isolated farmsteads and dwellings. Drayton Bassett is the largest of the three villages and is in the south-east of the area. The villages of Hints and Weeford are situated in the centre of the area, just south of both the A5 and Watling Street (a Roman road, with this stretch being known locally as Rock Hill). There is a small hamlet of approximately 20 dwellings along Flats Lane/Jerry's Lane at Packington Moor, focused on the crossing of Knox's Grave Lane/Tamworth Lane. These villages have limited day-to-day facilities and the residents regularly patronise shops and facilities in the nearby urban areas of Sutton Coldfield, Tamworth and Lichfield.

2.1.4 Agriculture and forestry form the predominant land uses within the area, together with some areas of sand and gravel workings. Arable farming is the principal activity in both the north and south, whilst in the centre of the area the steeper hillsides are used for grazing and the more gently sweeping slopes for market gardening.

2.1.5 The southern part of the area is crossed by Gallows Brook, which flows into the extensive network of lakes associated with former gravel workings at Dosthill Quarry, to the east of Drayton Bassett. The Black Brook flows west to east through the area to the ford at Hints, where its name changes to Bourne Brook, feeding into the River Tame at Tamworth to the east[1].

2.1.6 The landform of the area generally rises from low ground around Drayton Bassett up to an elevated plateau at Packington Heath. Around the course of the Black-Bourne Brook, at Hints and Weeford, the relatively level and gently undulating ground gives way to a series of steeply sided rolling hills and interlocking valleys, creating a sense of remoteness, tranquillity and enclosure, made distinctive by a series of prominent hill

[1] Where the text refers to the entire length of this watercourse, it is referred to as the Black-Bourne Brook.

tops. Further north at Packington Moor, wide sweeping slopes and gently undulating hills offer panoramic views across the landscape.

2.1.7 There are numerous copses and parcels of woodland within the area, particularly in the hills to the south of Hints and Weeford. There are also notable areas of trees and woodland associated with manor estates and parklands, primarily in the north of the area around Swinfen Hall and Freeford Manor (Volume 2: CFA21 Map Book, Map CT-10-61a, D10). Two areas of ancient woodland, Rookery and Roundhill Wood, are located within the area, both in the hills to the south of Hints.

## Key transport infrastructure

2.1.8 The A5 and Watling Street are the key routes connecting Hints and Weeford with Lichfield and Shenstone in the west and with Tamworth in the east. The A453 Sutton Road, which runs from Tamworth to Sutton Coldfield, passes through the southern part of the area. The A51 Tamworth Road runs through the northern part of the area, also connecting Lichfield with Tamworth. Flats Lane/Jerry's Lane runs north from Weeford to connect with Whittington and the south-east part of Lichfield. In the undulating hills south of Hints and Weeford, only narrow private farm and estate roads exist, which provide access to a scattering of farmsteads and isolated dwellings. Drayton Lane in the south connects Drayton Bassett with routes to the west and towards the A446 and the M6 Toll.

2.1.9 The M6 Toll and the A38 dual carriageway run to the west, with a major intersection connecting the A38, the M6 Toll and the A5 located just over 1km west of Weeford village. There are no existing railways within the area.

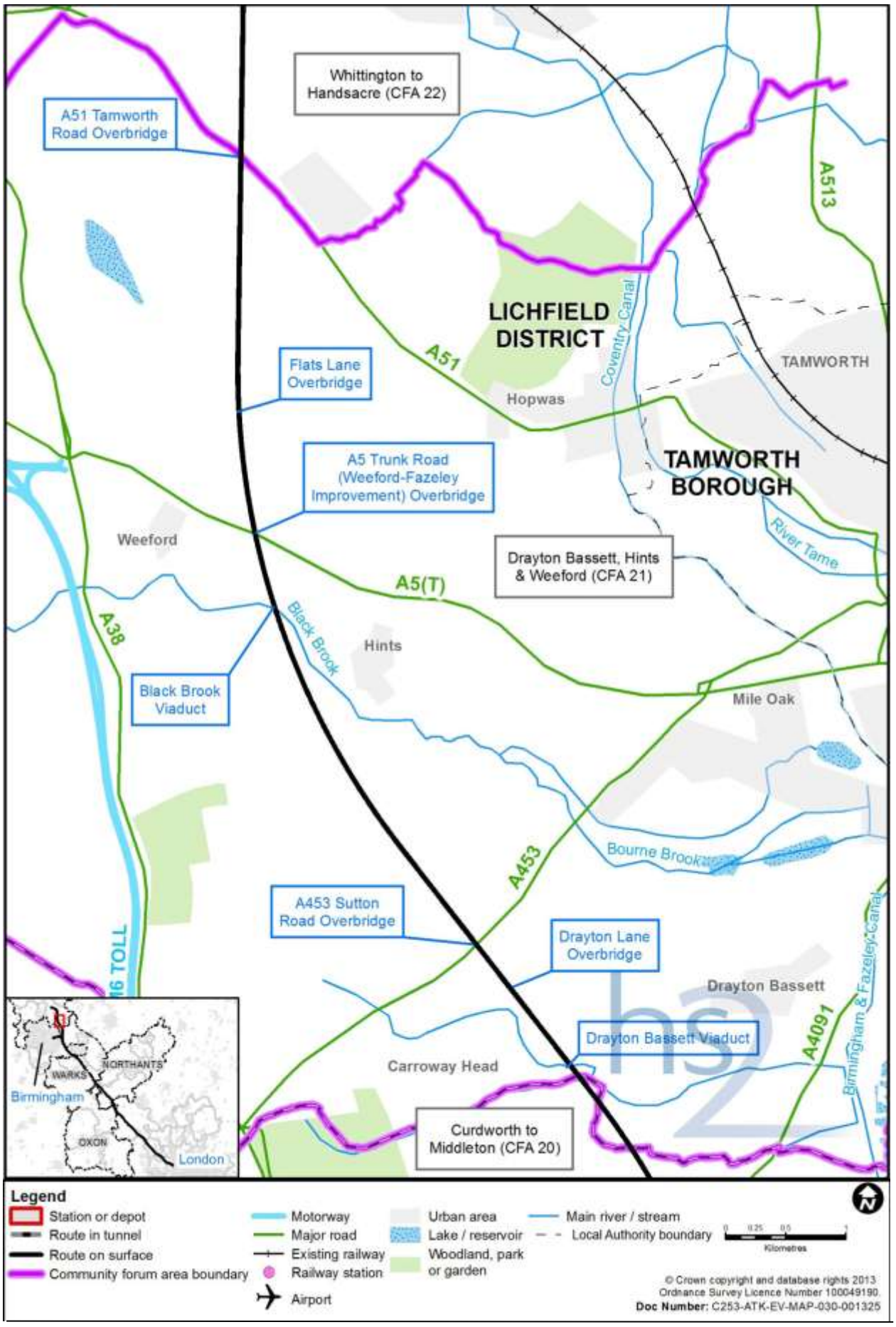
2.1.10 A well-developed network of public rights of way (PRoW) exists in the area, particularly around Weeford and Hints. The Heart of England Way is the most notable route and meanders northwards from Drayton Bassett, passing between Hints and Weeford and crossing Packington Moor to head towards Lichfield. Much of the Heart of England Way north of Weeford and Hints is also classified as a bridleway and there are well connected bridleway routes that link the villages to Whittington Heath in the north and Hopwas Hays Wood to the east. These routes are used by Weeford Stables and Riding Centre for trekking. In total the Proposed Scheme will cross five bridleways and nine public footpaths in the area.

## Socio-economic profile

2.1.11 There are no Demographic Character Areas in the Drayton Bassett, Hints and Weeford study area. To provide a socio-economic context for the area, data are reported at the district level in this study area. In total, the population of the Lichfield District is 100,700[2], highlighting the low population density and rural nature of the area. The area's labour market outperforms England's as a whole; unemployment at 6% is slightly lower than the national level of 7%[3].

[2] ONS (2012), *Census 2011*, ONS, London.
[3] All data come from the 2011 Population Census.

Figure 2: Area context map



## Notable community facilities

2.1.12 Drayton Bassett has a primary school, church, recreation ground and community halls. There is also a day care nursery located approximately 1km to the west of the village at Drayton Lane. Given the proximity of the village to the southern edge of Tamworth, residents look to the larger town for many of their basic services. Hints and Weeford both have a church and a village hall, and Weeford also has a restaurant, but neither village benefits from a primary school or any other facilities. Residents of these villages are dependent upon travelling to other nearby centres to access basic day-to-day services.

2.1.13 There are no convenience shopping facilities within the three villages of Drayton Bassett, Hints and Weeford, with the only retail provision being linked to visitor/craft centres at Swinfen Hall and Buzzard Valley Vineyard at Shirrall Drive, together with the farm shop at Packington Moor to the north of Weeford. The farm shop has a butcher, bakery, delicatessen and grocery.

## Recreation, leisure and open space

2.1.14 There are few recreational facilities within the area. There is a well-established network of PRoW around Hints, which are likely to be valued by the community as local walking routes and which provide access to the surrounding countryside. There is a village club at Drayton Bassett and a restaurant at Weeford. There is a café at the Packington Moor Farm and the Buzzard Valley Vineyard at Shirrall Drive also has a restaurant and a number of fishing lakes open to the public. Weeford Stables is located to the south-west of the village and offers a variety of riding lessons and trekking holidays. The Drayton Manor theme park is a major visitor destination in the area and is situated on the southern edge of Tamworth, just north of Drayton Bassett. Packington Moor Farm is used as a venue for weddings and events, with some limited on-site visitor accommodation.

## Policy and planning context

### *Planning framework*

2.1.15 Given that HS2 is being developed on a national basis to meet a national need it is not included or referred to in any local plans. Nevertheless, in seeking to consider the Proposed Scheme in the local context, relevant local plan documents and policies have been considered in relation to environmental topics.

2.1.16 Local policies in the Lichfield District Local Plan – Our Strategy (July 2012), which Lichfield District Council submitted to the Secretary of State for examination on 22 March 2013 with a schedule of proposed modifications[4] have been considered and referred to where appropriate to the assessment.

2.1.17 There are a number of key planning designations in the area, which include conservation areas, listed buildings, scheduled monuments, important archaeological sites, historic parks and gardens and ancient woodland. These are shown on the maps in Volume 2: CFA21 Map Book, Maps CT-10-059 through CT-10-061a.

[4] Lichfield District Council (2012), *Lichfield District Local Plan – Our Strategy, July 2012 (Proposed Submission) and Schedule of Proposed Modifications to the Local Plan: Strategy Proposed Submission March 2013.*

### *Committed development*

2.1.18 Developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme, are shown on Volume 5: Cross-Topic Map Book, Map series CT-13 and listed in Volume 5: Appendix CT-004-000. Except where noted otherwise in this Appendix, it has been assumed that these developments will have been completed by 2017. These are termed 'committed developments' and have been taken into account for the purpose of assessing the likely significant environmental effects of the Proposed Scheme. Where these developments have a particular relevance to an assessment topic, this is noted in the future baseline section for that topic. The following developments are relevant to several topics assessments in this area:

- 11/00761/FUL – Draytonlane End Farm, Sutton Road, Mile Oak, Tamworth, Staffordshire B78 3DZ. Demolition and replacement of existing barn (Map CT-13-059, E7, CFA21/1);
- 13/00076/FUL – 17 Flats Lane, Whittington Heath, Lichfield, Staffordshire WS14 9QQ. Erection of a general purpose agricultural building (Map CT-13-061a, H7, CFA21/2);
- 12/00383/COU – Packington Moor Farm, Jerry's Lane, Lichfield, Staffordshire WS14 9QB. Change of use of store to business use (Map CT-13-061a, F6, CFA21/3);
- 12/00408/COU – Packington Moor Farm, Jerry's Lane, Lichfield, Staffordshire WS14 9QB. Change of use from open-fronted machinery storage to storage and distribution use (building 1) (Map CT-13-061a, F6, CFA21/4);
- 12/01294/COU – Packington Moor Farm, Jerry's Lane, Lichfield, Staffordshire WS14 9QB. Change of use of Dutch barn to storage and distribution uses (Map CT-13-061a, F6, CFA21/5);
- 12/00677/COU – Horsley Brook Farm, Tamworth Road, Whittington Heath, Lichfield, Staffordshire WS14 9PT. Change of use of traditionally constructed barns to form two dwellings (Map CT-13-061a, D7, CFA21/6); and
- 11/01027/COU – Horsley Brook Farm, Tamworth Road, Whittington Heath, Lichfield, Staffordshire WS149PT. Change of use of existing stables to form accommodation for work riders (Map CT-13-061a, D7, CFA21/7).

2.1.19 However, where a committed development lies wholly or partly within the land required for the Proposed Scheme, it is assumed that the development will not be commenced or completed in its proposed form. Such developments are noted in Volume 5: Appendix CT-004-000/2.

2.1.20 Planning applications yet to be determined and sites that are proposed allocations in development plans that have yet to be adopted, on or close to the Proposed Scheme, are termed 'proposed developments'. These are listed in Volume 5: Appendix CT-004-000/2. They are not included in the assessment. The progress of these proposals is being monitored by HS2 Ltd and appropriate action will be taken, if they are approved.

## 2.2 Description of the Proposed Scheme

2.2.1 The following section describes the main features of the Proposed Scheme in the Drayton Bassett, Hints and Weeford area, including the main environmental mitigation measures. Further generic information on typical permanent features is provided in Volume 1, Section 5. Similarly, a general description of the approach to mitigation is set out in Volume 1, Section 9.

2.2.2 The Proposed Scheme will require some land on a permanent basis, key features of which are illustrated on Volume 2: CFA21 Map Book, Maps CT-06-116b to CT-06-124a-L3. Land that will also be required, but only on a temporary basis for construction, is set out in Section 2.3.

2.2.3 In general, features are described from south to north along the route (and east to west for features that cross HS2).

2.2.4 Since the draft ES was published, the following changes have been introduced to permanent features of the Proposed Scheme:

- the Drayton Bassett viaduct has been shortened by 93m (to 155m);
- two additional balancing ponds have been included near Job's Hill;
- the realignment of the A5 has been changed to online rather than offline;
- the Black Brook viaduct has been shortened by 45m (to 105m);
- replacement floodplain storage has been included near the Black Brook viaduct;
- a Bridleway bridge has been included for the Heart of England Way; and
- the A51 Tamworth Road crossing has been changed to an online bridge, utilising the existing connection to the roundabout.

### Overview

2.2.5 The Proposed Scheme through this area will be approximately 9.1km in length, commencing approximately where it crosses Gallows Brook to the north of Middleton. The route will then proceed north-westwards to the west of Drayton Bassett, passing over the Gallows Brook floodplain, under Drayton Lane, the A453 Sutton Road, Drayton Bassett Footpath 11 and Bangley Lane (also known locally as Waggoner's Lane) which is also coincident with Hints Bridleway 20.

2.2.6 The route will cross over Hints Footpaths 8 and 9, under Hints Footpaths 13 and 14, then over Brockhurst Lane (also known locally as Rookery Lane) as it curves to the north and passes to the west of Hints. The route will then cross over the Black Brook floodplain, then under Watling Street (also known locally as Rock Hill) and the A5 to the east of Weeford.

2.2.7 Passing under Flats Lane/Jerry's Lane, the route will straighten and head in a northerly direction, through Packington Moor Farm and across the access to Horsley Brook Farm. The northern boundary of the area is where the route will pass under the A51 Tamworth Road adjacent to the Whittington Arms public house.

### *Gallows Brook Culvert to Oak Dairy Farm*

2.2.8 The Proposed Scheme enters the Drayton Bassett, Hints and Weeford area on embankment continuing from the Curdworth to Middleton area (CFA20). The Proposed Scheme then continues north on embankment, crossing Gallows Brook on a viaduct (Volume 2: CFA21 Map Book, Maps CT-06-116b, G6 to CT-06-117, H6). Key features of this section, which is approximately 800m long, will include:

- an embankment approximately 1.1km (Trickley Coppice embankment, starting in Curdworth to Middleton CFA20) with a height up to approximately 7.5m and including a culvert crossing over a minor watercourse (Gallows Brook, south branch);
- a viaduct approximately 155m long (Drayton Bassett viaduct) over the Gallows Brook floodplain; and
- an embankment approximately 190m long with a height of approximately 4.5m.

2.2.9 Landscape earthworks with landscape planting will be provided almost up to where the railway line crosses Gallows Brook for a second time; an ecological mitigation area will be provided to the west of the route; and raised earthworks with landscape planting will be provided either side of the route north of the Drayton Bassett viaduct. A noise fence barrier will extend along the east side between the raised earthworks and across the viaduct. A balancing pond and Drayton Lane auto-transformer station will be provided on the east side of the route, approximately 100m to the south of Oak Dairy Farm.

### *Oak Dairy Farm to Hints Footpath 9*

2.2.10 Continuing to the north, the route enters a cutting with overbridges for Drayton Lane, the A453 Sutton Road and Bangley Lane. This section will be approximately 2.2km long (Volume 2: CFA21 Map Book, Maps CT-06-117, H6 to CT-06-118, D6) and will include the following key features:

- a cutting (Drayton Lane cutting) starting adjacent to Oak Dairy Farm for a length of approximately 2.2km, with a depth of approximately 16.5m; and
- overbridges for Drayton Lane, the A453 Sutton Road, Drayton Bassett Footpath 11, and Bangley Lane.

2.2.11 A new permanent road diversion for Drayton Lane will be constructed from Stone House on the east side of the route to the A453 Sutton Road on the west side of the route; this part of the lane is also followed by the Heart of England Way. The unadopted Shirrall Drive (largely coincident with Drayton Bassett Bridleway 10) will be reconfigured to form a junction with Drayton Lane on the west side of the route, with the short separate length of Drayton Bassett Bridleway 10 diverted to follow the realigned roads. There will be a new overbridge crossing for the A453 Sutton Road over the route, on the line of the existing road. An overbridge will be constructed slightly to the south of the existing alignment of Bangley Lane.

2.2.12 A balancing pond will be provided on the east side of the route just to the south of Bangley Lane. Raised earthworks with landscape planting will be provided on both

sides of the route where not in cutting and an ecological mitigation area will be provided on the east side south of the A453 Sutton Road.

### *Hints Footpath 9 to north of Brockhurst Lane*

2.2.13 The route in this section will be approximately 1.3km long. It commences on a low embankment before bearing north and entering a series of cuttings into the slopes of the hills to the east of Hints (Volume 2: CFA21 Map Book, Maps CT-06-118, D6 to CT-06-120, F6) and will include the following key features:

- an embankment approximately 500m long beginning just south of the Hints Footpath 9 PRoW, reaching a height of approximately 4.5m; and
- a cutting for a length of approximately 850m with a depth of approximately 15m, commencing at the southern boundary of Roundhill Wood.

2.2.14 An underpass for Hints Footpath 9 and a connection with the diverted Hints Footpath 8 will be provided to the north of Bangley Lane. A green overbridge for Hints Footpath 14 and connections with the diverted Hints Footpath 13 will be provided to the north of Roundhill Wood.

2.2.15 South of Roundhill Wood, raised landscape earthworks and landscape planting will be provided on both sides of the railway line; north of Roundhill Wood, raised landscape earthworks and planting will be provided along the east side and landscape planting along the west side. Ecological mitigation areas will be provided on both sides of the route, with woodland habitat creation west of the route and grassland habitat creation east of the route, west of Black Brook.

### *Brockhurst Lane to Black Brook*

2.2.16 This section of the route will be approximately 800m long (Volume 2: CFA21 Map Book, Maps CT-06-120, F6 to CT-06-120, B6) and will include the following key features:

- an embankment approximately 670m long beginning just to the south of Brockhurst Lane, reaching a maximum height of approximately 7m; and
- viaduct over Black Brook approximately 105m long.

2.2.17 An underbridge will be constructed for Brockhurst Lane, which will have headroom limited to 2.7m and thus restrict motorised users Brockhurst Lane will pass under the route on its existing horizontal and vertical alignment. The underbridge will also accommodate the permanent diversion of Hints Footpath 11 under the railway line, which will continue along the west side of the route to connect from Brockhurst Lane to the existing Footpath approximately 500m to the north of Brockhurst Lane. Hints Footpath 19 will be permanently re-routed under the Black Brook viaduct in place of the existing Footpath, which crosses the route approximately 80m further north.

2.2.18 Landscape earthworks will be provided on the east side of the route and landscape planting will be provided on both sides of the railway line. Ecological mitigation areas will be provided on both sides of the route, with substantial areas of woodland habitat creation to the west adjacent to Job's Hill Plantation, and grassland habitat creation west of Black Brook on the east side of the route. Planting and hedgerow improvements to the west of the railway line will be provided to connect existing

woodland areas. Two balancing ponds will be located in the ecological mitigation areas west of the proposed route, to either side of Job's Hill Plantation.

### *Black Brook to the A51 Tamworth Road*

2.2.19 The approximate length of this section of the route is 4km and consists of a short length of embankment then a continuous length of cutting extending as far as the Drayton Bassett, Hints and Weeford area boundary (Volume 2: CFA21 Map Book, Maps CT-06-121, I6 to CT-06-123a, F6) and will include the following key features:

- a length of embankment less than 50m long;
- a cutting for a length of approximately 3.9km, with a depth of up to 15m as the railway line approaches Horsley Brook Farm; and
- overbridges for Watling Street; the A5 Trunk Road; Flats Lane; and the A51 Tamworth Road.

2.2.20 An auto-transformer station will be provided near Flats Lane on the west side of the railway line to the north of the A5. The Watling Street overbridge will be provided on the existing road alignment. Flats Lane will be realigned to the east of the route and reconnect with the existing road to the west of the railway line. The A5 Trunk Road (Weeford-Fazeley improvement) overbridge will be constructed almost online and approximately 2m higher than existing levels, with asymmetric realignment to the north. New junctions with Knox's Grave Lane (Swinfen and Packington Bridleway 7) and Tamworth Lane (Swinfen and Packington Bridleway 5) will be provided on the east and west sides of the route. Swinfen and Packington Bridleway 8 (Heart of England Way) will be realigned to a new bridge approximately 100m north of its current position adjacent to Horsley Brook Farm. A new access to Horsley Brook Farm and Ingleyhill Farm will be provided from the A51 Tamworth Road. The A51 Tamworth Road overbridge will be provided as an online bridge.

2.2.21 Landscape planting will be provided along the top of the cutting on both sides of the route. A large ecological mitigation area with mixed woodland and grassland will be provided between the railway line and the A51 Tamworth Road to the east of the route to replace heathland and other habitats lost to the Proposed Scheme. Additional woodland habitat will be created on both sides of the route between Horsley Brook Farm and the A51 Tamworth Road.

2.2.22 The route will leave the Drayton Bassett, Hints and Weeford area in the north at approximately 5m below ground level.

## 2.3 Construction of the Proposed Scheme

2.3.1 This section sets out the strategy for construction of the Proposed Scheme in the Drayton Bassett, Hints and Weeford area, including:

- overview of the construction process;
- description of the advance works;
- description of the engineering works to build the railway;
- construction waste and material resources;

- commissioning the railway; and
- indicative construction programme.

2.3.2 The assessment presented in this ES is based on the construction arrangements as described in this section.

2.3.3 In addition to the land that will be required permanently by the Proposed Scheme (see Section 2.2), land will be required on a temporary basis for construction. Key temporary construction features are illustrated on the Volume 2: CFA21 Map Book, Maps CT-05-116b to CT-05-124a-L3. Following construction works, land required temporarily will be prepared for its eventual end use, which will include being returned to its pre-construction use wherever appropriate.

2.3.4 A guide to standard construction techniques is provided in Volume 1, Section 6. In instances for which more than one possible construction technique might be possible, this section specifies which technique has been assumed for the purposes of the assessment.

## Overview of the construction process

2.3.5 Building and preparing the railway for operation will comprise the following general stages:

- advance works, including: site investigations further to those already undertaken; preliminary mitigation works; preliminary enabling works;
- civil engineering works, including: establishment of construction compounds; site preparation and enabling works; main earthworks and structure works; and site restoration;
- railway installation works, including: establishment of construction compounds; infrastructure installation; connections to utilities; and changes to the existing rail network; and
- system testing and commissioning.

2.3.6 General provisions relating to the construction process are set out in more detail in Volume 1, Section 6.4 and Section 4 of the draft Code of Construction Practice (CoCP) (see Volume 5: Appendix CT-003-000) including:

- the approach to environmental management during construction and the role of the COCP;
- working hours;
- the management of construction traffic; and
- the handling of construction.

## Advance works

2.3.7 General information about advance works can be found in Volume 1, Section 6.4. Advance works will be required before commencing construction works and will typically include:

- further detailed site investigations and surveys;
- further detailed environmental surveys;
- advance mitigation works including, where appropriate, contamination remediation, habitat creation and translocation, and built heritage survey and investigation;
- highways works;
- demolition;
- site establishment with temporary fence construction; and
- utility diversions.

## Engineering works

2.3.8 Construction of the railway will require engineering works along the entire length of the route, and within land adjacent to the route. This will comprise two broad types of engineering work:

- civil engineering works, such as earthworks and erection of bridges and viaducts; and/or
- railway installation works, such as laying ballast or slabs and tracks, and/or installing power supply and communications features.

2.3.9 The construction of the Proposed Scheme will be subdivided into sections, each of which will be managed from construction compounds. The construction compounds will act as the main interface between the construction work sites and the public highway, as well as performing other functions as described below. Construction compounds will either be main compounds or satellite compounds, which are generally smaller. Some compounds will be used for civil engineering works and others for railway installation works, and in some cases for both.

2.3.10 In the Drayton Bassett, Hints and Weeford area there will be no main construction compounds; there will be 12 civil engineering satellite compounds and two roadheads, managed from main construction compounds located in CFA20 (Curdworth to Middleton: the A4097 Kingsbury Road overbridge main compound) and in CFA22 (Whittington to Handsacre: the Cappers Lane main compound). There will be an additional three rail systems satellite compounds in CFA21 for auto-transformer installation works at Drayton Lane and Flats Lane and for the installation of a package substation in CFA22 at the A51 Tamworth Road. These will be managed by the Kingsbury Road railhead in CFA20. Two of the railway installation compounds will use sites previously established for civil engineering works.

2.3.11 Figure 3 shows the management relationship for civil engineering works compounds and Figure 4 for the railway installation works compounds. Details about individual compounds are provided in subsequent sections of this report.

## General overview of construction compounds

2.3.12 Main compounds will be used for core project management staff (i.e. engineering, planning and construction delivery), and commercial and administrative staff. These management teams will directly manage some works and/or coordinate satellite compounds, which will manage other works. In general, main compounds will contain:

- space for the storage of bulk materials (aggregates, structural steel and steel reinforcement);
- space for the receipt, storage and loading/unloading of excavated material either onto or off the site;
- an area for the fabrication of temporary works equipment and finished goods;
- fuel storage;
- plant and equipment storage; and
- office space for management staff, limited car parking for staff and site operatives, and welfare facilities.

2.3.13 Satellite compounds will be used as the base to manage specific works along a section of the route. They will usually provide office accommodation for limited numbers of staff, local storage for plant and materials, limited car parking for staff and site operatives, and welfare facilities.

2.3.14 Some compounds will also accommodate additional functions as listed below. Where this is the case they will be included in the description of the compound:

- railheads will connect with the existing railway network for the delivery of materials for the construction of the rail systems, further details are provided later in this section; and
- roadheads will require an area of land for the storage and loading and unloading of bulk earthworks materials which are moved to and from the site on public highways.

Figure 3: Schematic of construction compounds for civil engineering works

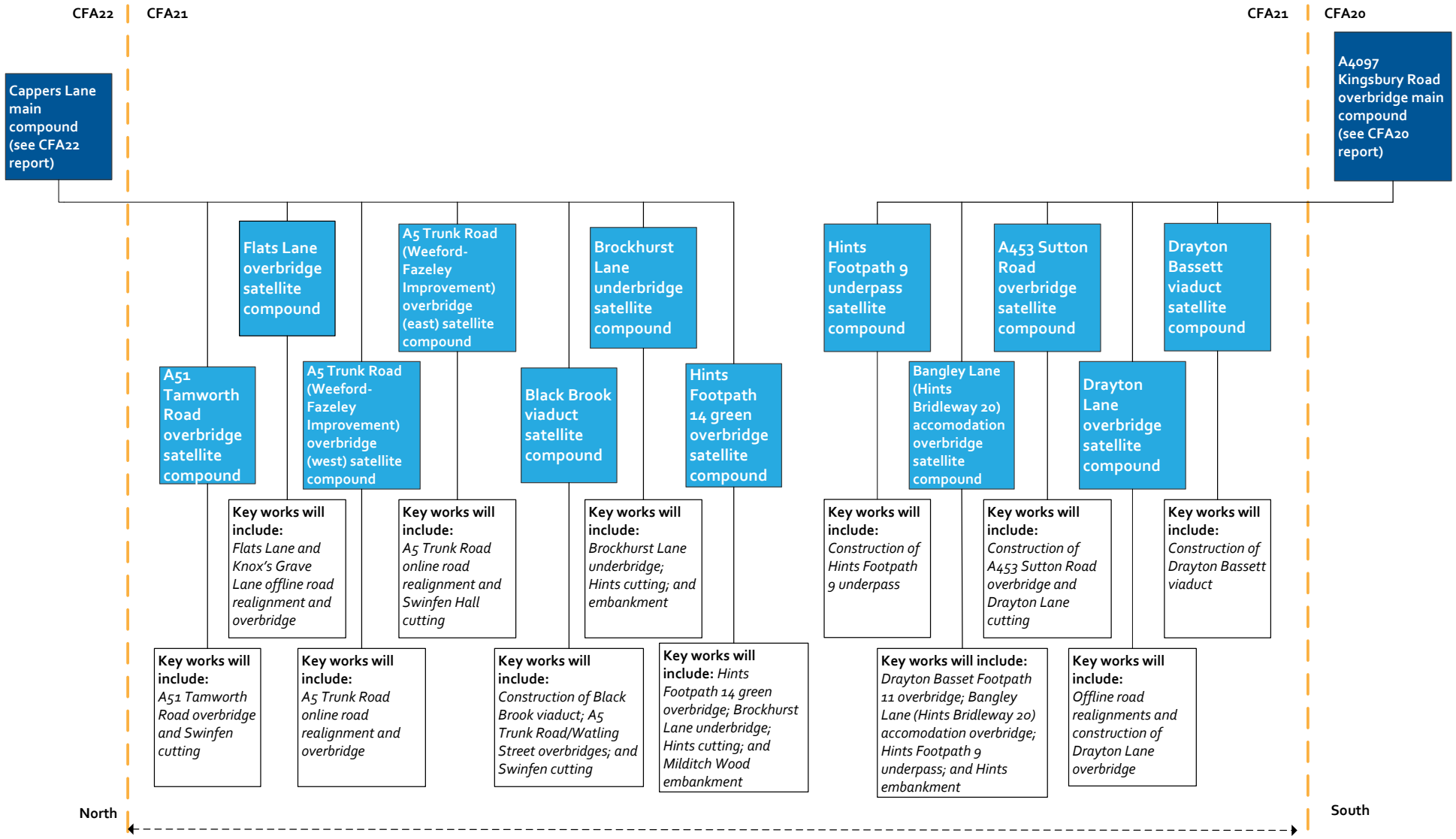
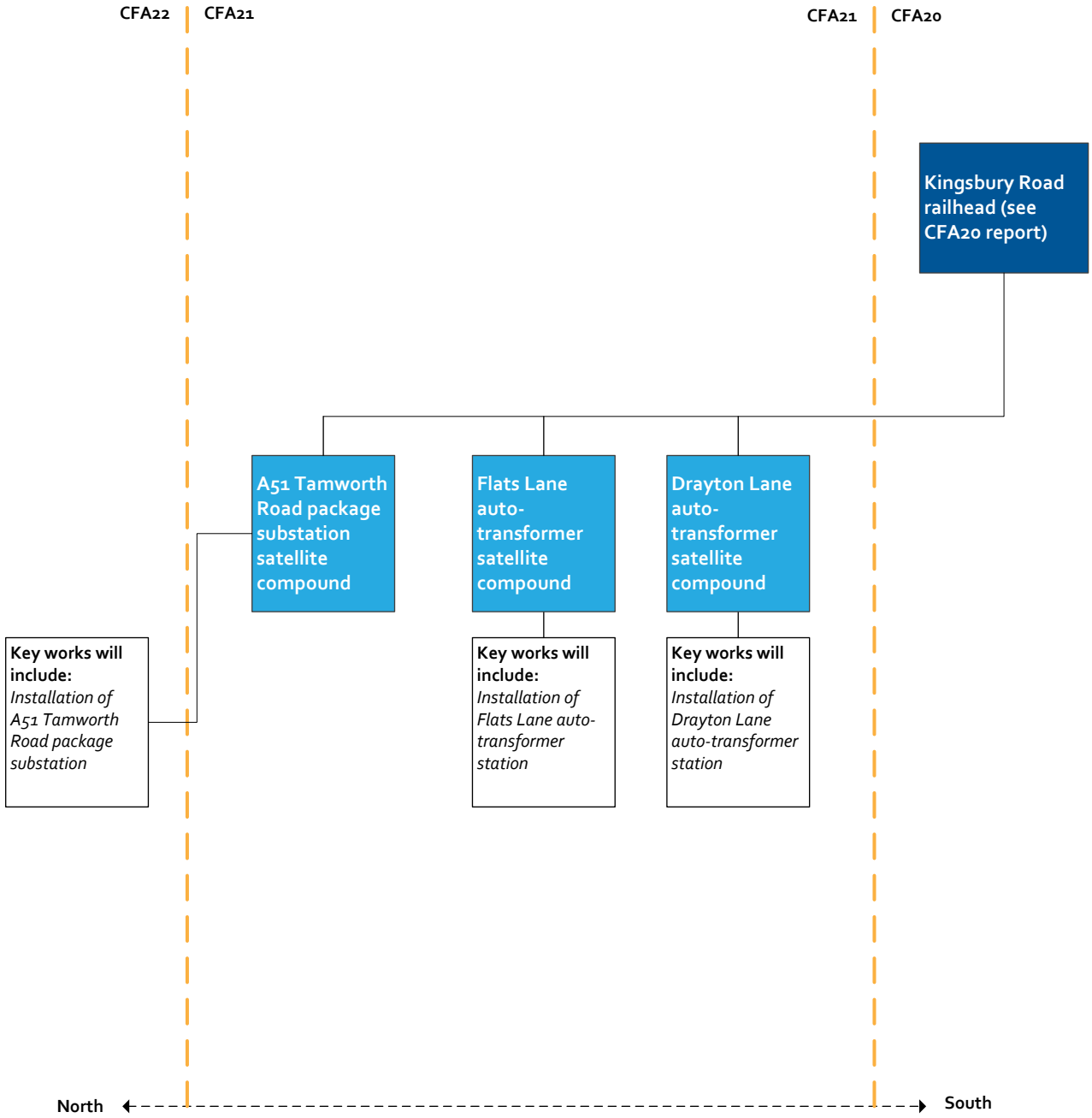


Figure 4: Schematic of construction compounds for railway installation works




2.3.15 In addition, areas adjacent to some compounds will be used for the storage of topsoil stripped as part of the works prior to it being used when the land is reinstated to its former use.

2.3.16 Further information on the function of compounds, including general provisions for their operation, including security fencing, lighting, utilities supply, site drainage, and codes of worker behaviour are set out in Volume 1, Section 6.6, and the draft CoCP, Section 5.

### *Construction traffic routes*

2.3.17 The movement of construction vehicles carrying materials, plant, other equipment and workforce (or moving empty) will take place both within the construction sites, on public roads and via the rail network. The construction compounds will provide the

interface between the construction works and the public highway or rail network, and the likely road routes to access compounds are described in subsequent sections below. Movements between the construction compounds and the work sites will be on designated haul roads within the site, often along the line of the Proposed Scheme or running parallel to it.

### *A4097 Kingsbury Road overbridge main compound (Volume 2: CFA20 Map Book, Map CT-05-119, F8)*

2.3.18 This compound will be located in Curdworth to Middleton CFA20 to the south and will comprise the main area administration and support for construction works in the Drayton Bassett, Hints and Weeford area up to and including Hints Footpath 9 underpass satellite compound; works north of this compound will be managed from Cappers Lane main compound in Whittington to Handsacre CFA22. Further details of these main compounds are provided in their respective CFA reports.

2.3.19 The A4097 Kingsbury Road overbridge main compound will manage the following principal works in this area in addition to the support facilities identified in 2.3.28:

- earthworks (embankments and cuttings); and
- mitigation planting and landscape earthworks.

### *Demolitions*

2.3.20 The buildings that will need to be demolished in this area are listed in Table 1.

Table 1: Demolition works for the portion of CFA21 managed from the A4097 Kingsbury Road overbridge main compound (up to Hints Footpath 9)

| Description of buildings | Location |
|---|---|
| Barn Cottage, Boarding Kennels and Cattery, Drayton Lane. One dwelling lost within this group (total buildings demolished – 4) | Map CT-05-117,E6 |
| Lone Oak, Drayton Lane: Residential property and associated out building (total buildings demolished – 2) | Map CT-05-117, D7 |
| Cranebrook, Drayton Lane. Farm building: one residential property and associated out buildings (total buildings demolished – 5) | Map CT-05-117, D7 |
| White House Farm, Bangley Lane. One dwelling within this group of farm buildings (total buildings demolished – 4) | Map CT-05-118, F7 |

2.3.21 The following highways and roads will be diverted, realigned, and/or subject to traffic management measures during construction of the Proposed Scheme as follows (illustrated on Volume 2: CFA21 Map Book, Map series CT-05):

- permanent diversion of Shirrall Drive to join Drayton Lane west of the route;
- permanent realignment of Drayton Lane to north of existing route;
- temporary realignment for the A453 Sutton Road to the south of its existing alignment for a period of approximately 18 months, while a new online overbridge is constructed; and
- permanent realignment of Bangley Lane with new offline overbridge to the south.

2.3.22 The following public footpaths and bridleways will be diverted or realigned:

- permanent diversion of the Drayton Bassett Bridleway 10 onto the route of the realigned Shirrall Drive to Drayton Lane;
- permanent alternate route for Heart of England Way over Drayton Lane overbridge;
- temporary realignment for Drayton Bassett Footpath 11 for a period of approximately 15 months, then permanent realignment across new overbridge close to its current route;
- permanent diversion of Hints Footpath 8 to join Hints Footpath 9 to the east of the route; and
- temporary realignment for Hints Footpath 9 for a period of approximately 10 months for construction of new underpass close to the original route.

2.3.23 A number of utilities will need to be diverted for the works, the principal diversions being:

- 300mm steel high pressure gas main between Bangley Lane and the A453 Sutton Road;
- 400 kilovolt (kV) overhead line between the A453 Sutton Road and Drayton Lane with temporary diversion to north of the existing route and permanently reinstated on the original line; and
- 400kV overhead line at Hints south of Roundhill Wood with temporary diversion to south to enable existing route to be raised to provide sufficient clearance over the route.

2.3.24 Overhead line works will require access to modify pylons remote from the diversion. A corridor of land beneath the power lines will be required for these works as indicated on Volume 2: CFA21 Map Book, Map series CT-05.

2.3.25 The route of the Proposed Scheme and associated highway works require four realignments of watercourses:

- realignment of Gallows Brook (south branch) along the west side of the route to new culvert (Volume 2: CFA21 Map Book, Map CT-06-116b, D5);
- realignment of unnamed watercourse under diverted Shirrall Drive (Volume 2: CFA21 Map Book, Map CT-06-117, F7);
- realignment of unnamed watercourse south of Bangley Lane (Volume 2: CFA21 Map Book, Map CT 06-118, E7); and
- realignment of unnamed watercourse at Roundhill Wood (Volume 2: CFA Map Book, Map CT-06-118, B6).

2.3.26 Finalisation works will include landscaping and planting.

### *Satellite construction compounds*

2.3.27 A total of five satellite construction compounds will be managed from the A4097 Kingsbury Road overbridge main compound to construct the works in this area. Table 2 details the principal construction activity, start date, approximate duration and number of workers, and highway access route for each associated programme:

Table 2: Satellite construction compounds managed by the A4097 Kingsbury Road overbridge main compound

| Compound name | Principal construction activity | Start date | Estimated duration of use | Number of workers (ave/peak) | Highways access route |
|---|---|---|---|---|---|
| **Gallows Brook Culvert to Oak Dairy Farm** | | | | | |
| Drayton Bassett viaduct satellite compound (Map CT-05-116b, C6) | Drayton Bassett viaduct | 2018 | 23 months | 25/25 | Drayton Lane to A453 Sutton Road |
| **Oak Dairy Farm to south of Hints Footpath 9** | | | | | |
| Drayton Lane overbridge satellite compound (Map CT-05-117, F6) | Drayton Lane overbridge and associated highway works | 2018 | 10 months | 20/20 | Drayton Lane to A453 Sutton Road |
| A453 Sutton Road overbridge satellite compound (Map CT-05-117, C5) | A453 Sutton Road overbridge and associated highway works | 2018 | 34 months | 25/30 | A453 Sutton Road |
| Bangley Lane (Hints Bridleway 20) accommodation overbridge satellite compound (Map CT-05-118, F6) | Drayton Bassett Footpath 11 overbridge, Bangley Lane (Hints Bridleway 20) accommodation overbridge and associated highway works | 2018 | 33 months | 20/32 | Haul route to A453 Sutton Road |
| Hints Footpath 9 underpass satellite compound (Map CT-05-118, D6) | Hints Footpath 9 underpass | 2018 | 10 months | 20/30 | Haul route to A453 Sutton Road |

### *Cappers Lane main compound (Volume 2: CFA22 Map Book, Map CT-05-125, I10)*

2.3.28 This main construction compound will be located in CFA22 (Whittington to Handsacre) to the north and will comprise the main area administration and support for construction works in CFA21, north of Hints Footpath 9.

2.3.29 Cappers Lane main compound will manage the following principal works in this area in addition to the support facilities identified in 2.3.36:

- earthworks (embankments and cuttings); and
- mitigation planting and landscape earthworks.

### *Demolitions*

2.3.30 The buildings that will need to be demolished in this area are listed in Table 3.

Table 3: Demolition works for CFA21 managed by the A4097 Kingsbury Road overbridge main compound (from Brockhurst Lane to the A51 Tamworth Road)

| Description of buildings | Location |
|---|---|
| Buck's Head Farm, Watling Street. One dwelling within this group of farm buildings (total buildings demolished – 12) | Volume 2: CFA21 Map Book, Map CT-05-121, G7 |
| Four dwellings on Flats Lane, Hints (Nos. 16, 17, 12, 13) and associated outbuildings (total buildings demolished – 11) | Volume 2: CFA21 Map Book, Map CT-05-121, B6 |
| Eight dwellings and associated outbuildings on Knox's Grave Lane: Nos. 1, 3, 5, 7, 9 and 11, 2 and the annex to No. 2 (total buildings demolished – 12) | Volume 2: CFA21 Map Book, Map CT-05-121, B6 |
| Packington Moor Farm, off Jerry's Lane. One dwelling unit within this group of farm buildings (total buildings demolished – 15) | Volume 2: CFA21 Map Book, Map CT-05-122, F6 |
| Ruttle Plant Ltd. Two industrial buildings, Tamworth Road, Whittington Heath (total buildings demolished – 2) | Volume 2: CFA21 Map Book, Map CT-05-121, G6 |

2.3.31 The following highways and roads will be diverted, realigned, and/or subject to traffic management measures during construction of the Proposed Scheme as follows (illustrated on Volume 2: CFA21 Map Book, Map series CT-05):

- Brockhurst Lane will be temporarily closed for vehicle traffic, for construction of a new online underpass with headroom limited to 2.7m; there will be temporary pedestrian re-route for a period of approximately 12 months; the Lane will be re-opened on its existing alignment after construction, but as a continuation of the private road and public pedestrian use that exists to the west;
- temporary offline alignment (approximately 18 months) for Watling Street, to the north of its existing alignment, with new online overbridge;
- permanent realignment of Flats Lane to the south-east with new offline overbridge; and
- temporary diversion of the A51 Tamworth Road to south of the existing route (approximately 20 months), for construction of new online overbridge.

2.3.32 The A5 will be realigned to be approximately 2m higher than its existing level on its existing horizontal alignment. To maintain safe operation of the dual carriageway it will be necessary to undertake the works under traffic management, which will operate for a period of approximately 15 months on the A38 and its slip roads, and is likely to include temporary speed restrictions for safety and temporary use of the hard shoulder to provide adequate working space; reduced lane widths may also be used at times. The works will generally use standard construction methods, and will be undertaken using the following construction phasing:

- single lane contraflow with traffic management established on the north carriageway;
- construction of A5 overbridge for south carriageway;
- place fill material to raise level of south carriageway using a temporary piled wall to retain the ground where necessary and surface new carriageway;

- divert traffic to a single lane contraflow with traffic management on the new south carriageway;
- construct A5 overbridge for north carriageway following standard methods as described in Volume 1;
- place fill material to raise level of north carriageway and surface new carriageway; and
- re-open all lanes of A5 dual carriageway.

2.3.33 The following public Footpaths and Bridleways will be diverted or realigned:

- permanent realignment of Hints Footpath 14 to new green overbridge;
- permanent diversion of Hints Footpath 13 to join Hints Footpath 14 to the east of the route;
- permanent diversion of Hints Footpath 11 to the west of the route to a new connection with Brockhurst Lane;
- permanent diversion of Hints Footpath 19 under Black Brook viaduct to a new connection with Hints Footpath 0.378;
- permanent diversion of Hints Footpath 0.378 on to new access track;
- permanent diversion of Hints Bridleway 4 across new footbridge over A5 and to new connection with Watling Street to the east of the route;
- permanent diversions of Swinfen and Packington Bridleway 5 (Knox's Grave Lane) and Bridleway 7 (Tamworth Lane) to the realigned Flats Lane; and
- permanent realignment of Swinfen and Packington Bridleway 8 (Heart of England Way) to Horsley Brook Farm green overbridge, north of the existing route.

2.3.34 Many utilities will need to be diverted for the works, the principal diversion in this area being a 300mm steel high-pressure gas main under Brockhurst Lane.

2.3.35 Finalisation works will include landscaping and planting.

### *Satellite construction compounds*

2.3.36 A total of eight satellite compounds will be managed from the Cappers Lane main compound. Table 4 details the principal construction activity, start date, approximate duration and number of workers, and highway access route for each associated programme.

Table 4: Satellite construction compounds managed by Cappers Lane main compound

| Compound name | Principal construction activity | Start date | Estimated duration of use | Number of workers (ave/peak) | Highways access route |
|---|---|---|---|---|---|
| **Hints Footpath 9 to Black Brook** | | | | | |
| Hints Footpath 14 green overbridge (Map CT-05-120, H7) | Hints Footpath 14 green overbridge | 2018 | 15 months | 20/30 | Haul route to Watling Street onto A5, A38 to west |
| Brockhurst Lane underbridge (Map CT-05-120, E6) | Brockhurst Lane underbridge | 2018 | 41 months | 20/30 | Along haul road onto Watling Street onto A5, A38 to west |
| **Black Brook to the A51 Tamworth Road** | | | | | |
| Black Brook viaduct (Map CT-05-121, I6) | Black Brook viaduct and Watling Street overbridge | 2018 | 54 months | 45/115 | Watling Street onto A5, A38 to west |
| A5 trunk road (Weeford-Fazeley improvement) overbridge (east) (Map CT-05-121, I2) | A5 trunk road online road realignment, A5 trunk road overbridge and A5 Hints Bridleway 4 overbridge | 2018 | 15 months | 55/80 | Watling Street onto A5, A38 to west |
| A5 trunk road (Weeford-Fazeley improvement) overbridge (west) (Map CT-05-121, E9) | A5 trunk road online road realignment, A5 trunk road overbridge and A5 Hints Bridleway 4 overbridge | 2018 | 15 months | 20/30 | Flats Lane/Watling Street onto A5, A38 |
| Flats Lane overbridge (Map CT-05-121, C7) | Flats Lane overbridge and associated highway works | 2018 | 16 months | 25/30 | Flats Lane/Watling Street onto A5, A38 |
| A51 Tamworth Road overbridge (Map CT-05-123a, F6) | A51 Tamworth Road overbridge and associated highway works | 2018 | 42 months | 25/30 | A51 Tamworth Road |

### *Roadheads*

2.3.37 Roadheads are areas for the storage and loading and unloading of bulk earthworks material which is moved to and from the site on public highways.

2.3.38 There will be two roadheads within the Drayton Bassett, Hints and Weeford area managed from the main compounds in CFA20 and CFA22:

- the A453 Sutton Road roadhead will not be used for stockpile of materials but will act as an access point at the A453 Sutton Road overbridge satellite compound; and
- a second roadhead will include temporary stockpile of materials and will be located at Watling Street (Map CT-05-121, H6).

2.3.39 Material arriving at the roadheads in this area will arrive from either the north or south via the A453 Sutton Road and via Watling Street.

### *Kingsbury Road railhead (Volume 2: CFA20 Map Book, Map CT-05-113-R1, I6)*

2.3.40 Kingsbury Road railhead (in CFA20) will be the main compound for the rail systems installation from Long Itchington Wood tunnel to the Handsacre tie-in and to Birmingham Curzon Street.

2.3.41 The railway compound will facilitate the following activities:

- permanent way (ballast and/or slab track) installation;
- overhead line electrification installation;
- train control;
- signalling;
- telecommunication fit-out; and
- line side power fit-out.

2.3.42 See the Volume 2 report for CFA20 (Curdworth to Middleton) for more details of the Kingsbury Road railhead.

2.3.43 The railhead will provide main compound support to three satellite compounds for rail systems activities within CFA21 as shown in Figure 4 and described in Table 5.

Table 5: Location of construction compounds managed by the Kingsbury Road railhead

| Compound name | Principal construction activity | Start date | Estimated duration of use | Number of workers (ave/peak) | Highways access route |
|---|---|---|---|---|---|
| Drayton Lane auto-transformer station[5] (Map CT-05-116b, B5) | Auto-transformer station installation | 2022 | 15 months | 30/40 | Drayton Lane to A453 Sutton Road |
| Flats Lane auto-transformer station (Map CT-05-121, E7) | Auto-transformer installation | 2022 | 15 months | 30/40 | Flats Lane/Watling Street onto A5, A38 |
| A51 Tamworth Road package substation (Map CT-05-123a, F7) | Package substation installation | 2022 | 4 weeks | 2/4 | A51 Tamworth Road |

## Construction waste and material resources

2.3.44 Forecasts of the amount of construction, demolition and excavation waste (CDEW) and worker accommodation site waste that will be produced during construction of the Proposed Scheme in the Drayton Bassett, Hints and Weeford area have been prepared and are presented in Volume 5: Appendix WM-001-000.

2.3.45 The majority of excavated material that will be generated across the Proposed Scheme will be reused as engineering fill material or in the environmental mitigation earthworks of the Proposed Scheme, either with or without treatment.

2.3.46 Based on the mitigation earthworks design approach adopted for the Proposed Scheme, local excess or shortfall of excavated material within the Drayton Bassett, Hints and Weeford area will be managed with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material is presented in Volume 3, Section 14.

2.3.47 The quantity of surplus excavated material originating from the Stoneleigh, Kenilworth and Burton Green area that will require off-site disposal to landfill as excavation waste is shown in Table 6. This is the forecast quantity of contaminated excavated material that is chemically unsuitable for reuse within the Proposed Scheme.

2.3.48 The quantities of demolition, construction and worker accommodation site waste that will be reused, recycled and recovered (i.e. diverted from landfill) have been based on the landfill diversion performance of similar projects as follows:

- demolition waste: 90%;
- construction waste: 90%; and
- worker accommodation site waste: 50%.

2.3.49 The quantities of demolition, construction and worker accommodation site waste that will require off-site disposal to landfill are shown in Table 6.

[5] This compound will reutilise the Drayton Bassett viaduct satellite compound.

Table 6: Estimated construction demolition and excavation waste

| Waste type | Estimated material quantities that will be generated (tonnes) | Estimated quantity of waste for off-disposal to landfill (tonnes) |
|---|---|---|
| Excavation | 6,610,208 | 0 |
| Demolition | 45,758 | 4,576 |
| Construction | 11,374 | 1,137 |
| Worker accommodation site | 0 | 0 |
| TOTAL | 6,667,340 | 5,713 |

2.3.50 The assessment of the likely significant environmental effects associated with the disposal of CDEW and worker accommodation site waste has been undertaken for the Proposed Scheme as a whole (see Volume 3, Section 14).

## Commissioning of the railway

2.3.51 Commissioning is the process of testing the infrastructure to ensure that it operates as expected and will be carried out in the period prior to opening. Further details are provided in Volume 1, Section 6.26.

## Construction programme

2.3.52 A construction programme that illustrates indicative periods for the construction activities in this area described above is provided in Figure 5.

Figure 5: Indicative construction programme for CFA21

| Construction activity | 2017 quarters | | | | 2018 quarters | | | | 2019 quarters | | | | 2020 quarters | | | | 2021 quarters | | | | 2022 quarters | | | | 2023 quarters | | | | 2024 quarters | | | | 2025 quarters | | | | 2026 quarter | | | | 2027 quarters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Advance works** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Advance works | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Civil engineering works** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **A4097 Kingsbury Road overbridge main compound (CFA20)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trickley Coppice embankment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drayton Lane embankment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drayton Lane cutting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Drayton Bassett viaduct satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drayton Bassett viaduct | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Drayton Lane overbridge satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drayton Lane overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **A453 Sutton Road overbridge satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A453 Sutton Road overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Bangley Lane accommodation overbridge** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bangley Lane accommodation overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Construction activity | 2017 quarters | | | | 2018 quarters | | | | 2019 quarters | | | | 2020 quarters | | | | 2021 quarters | | | | 2022 quarters | | | | 2023 quarters | | | | 2024 quarters | | | | 2025 quarters | | | | 2026 quarter | | | | 2027 quarters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Hints Footpath 9 underpass satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hints Footpath 9 underpass | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cappers Lane main compound (CFA22)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hints embankment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hints cutting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Milditch Wood embankment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Swinfen cutting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Swinfen Hall aqueduct | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Hints Footpath 14 green overbridge satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hints Footpath 14 green overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Brockhurst Lane underbridge satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brockhurst Lane underbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Black Brook viaduct satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black Brook viaduct | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Construction activity | 2017 quarters | | | | 2018 quarters | | | | 2019 quarters | | | | 2020 quarters | | | | 2021 quarters | | | | 2022 quarters | | | | 2023 quarters | | | | 2024 quarters | | | | 2025 quarters | | | | 2026 quarter | | | | 2027 quarters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **A5 trunk road overbridge (east) and (west) satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Watling Street overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A5 trunk road overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Flats Lane overbridge satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flats Lane overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **A51 Tamworth Road overbridge satellite compound** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A51 Tamworth Road overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Horsley Brook Farm green overbridge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Rail infrastructure and systems works** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rail installation works (from Kingsbury Road railhead) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drayton Lane auto-transformer station | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flats Lane auto-transformer station | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A51 package substation (construction compound in CFA21) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Construction activity | 2017 quarters | | | | 2018 quarters | | | | 2019 quarters | | | | 2020 quarters | | | | 2021 quarters | | | | 2022 quarters | | | | 2023 quarters | | | | 2024 quarters | | | | 2025 quarters | | | | 2026 quarter | | | | 2027 quarters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Commissioning** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Commissioning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Key: Construction works Compound duration

## 2.4 Operation of the Proposed Scheme

### Operational specification

2.4.1 Volume 1, Section 4.3 describes the envisaged operational characteristics of Phase One of HS2 as a whole and how they may change when Phase Two is also operational.

#### *HS2 services*

2.4.2 It is anticipated that initially and with Phase One in place there will be 8 trains per hour each way passing through the Drayton Bassett, Hints and Weeford area in the morning and evening peak hours, and fewer during other times. The first trains of the day will leave the terminus stations no earlier than 05:00 Monday to Saturday (and 08:00 on Sundays) and the last would arrive no later than midnight.

2.4.3 It is anticipated that with Phase Two in place the frequency could rise to 12 trains per hour each way during peak hours. The assessment of sound, noise and vibration has taken into account the frequency during Phase Two.

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

#### *Maintenance*

2.4.5 Volume 1, Section 4.3 describes the maintenance regime for HS2.

2.4.6 The intention is that maintenance staff will access the railway to carry out inspections and maintenance on a regular basis. This will be at night when the railway is not operating. There will be routine preventative maintenance, including grinding and milling of the rails to keep them in good condition, and more periodic heavy maintenance as necessary.

### Operational waste and material resources

2.4.7 Forecasts of the amount of operational waste that will be produced annually during operation of the Proposed Scheme have been prepared and are presented in Volume 5: Appendix WM-001-000.

2.4.8 Railway station and train waste refers to waste that will arise at each station. It will include waste from station operations and passenger waste removed from trains at terminating stations. This has only been reported for areas along the route in which these stations will be located.

2.4.9 Rolling stock maintenance waste is that which will be generated by the relevant train operating company at rolling stock maintenance facilities. This has only been reported for the areas along the route in which these facilities will be located.

2.4.10 Track maintenance waste and ancillary infrastructure waste (for example waste from depots, signalling locations, operations and maintenance sites) has been estimated using an average waste generation rate per kilometre length of total track. For this reason, both track maintenance waste and ancillary infrastructure waste has been reported for each area along the route.

2.4.11 The quantity of operational waste that will be reused, recycled and recovered (i.e. diverted from landfill) has been based on landfill diversion performance information from Network Rail and other sources as follows:

- railway station and trains: 60%;
- rolling stock maintenance: 80%;
- track maintenance: 85%; and
- ancillary infrastructure: 60%.

2.4.12 On this basis, approximately 129 tonnes of operational waste will be reused, recycled and recovered during each year of operation of the Proposed Scheme in the Drayton Bassett, Hints and Weeford area. Approximately 27 tonnes will require disposal to landfill (see Table 7).

Table 7: Operational waste forecast for the Proposed Scheme

| Waste source | Estimated quantity of waste generated per annum (tonnes) | Estimated quantity of waste for disposal to landfill per annum (tonnes) |
|---|---|---|
| Railway station and trains | 0 | 0 |
| Rolling stock maintenance | 0 | 0 |
| Track maintenance | 144 | 22 |
| Ancillary infrastructure | 12 | 5 |
| **TOTAL** | 156 | 27 |

2.4.13 The assessment of the likely significant environmental effects associated with the disposal of operational waste has been undertaken for the Proposed Scheme as a whole (see Volume 3, Section 14).

## 2.5 Community forum engagement

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

2.5.2 The engagement undertaken within this community forum area is summarised below. A series of community forum meetings and discussions with individual landowners, organisations and action groups were undertaken. Community forum meetings were held on:

- 4 April 2012 at Hints Village Hall;
- 19 June 2012 at Hints Village Hall;
- 4 September 2012 at Hints Village Hall;
- 20 November 2012 at Hints Village Hall;
- 21 February 2013 at Hints Village Hall; and
- 3 October 2013 at Hints Village Hall.

2.5.3 In addition to HS2 representatives, attendees at these community forum meetings typically included local residents (and residents' groups); public representatives; representatives of local authorities and parish and district councils; action groups; affected landowners and other interested stakeholders.

2.5.4 The main themes to emerge from these meetings were:

- tunnel option or proposed relocation of the community along Flats Lane;
- removal of agricultural land;
- potential adverse impacts on the village of Hints, compensation, conservation area status, high visual quality;
- Hints Village Hall as a cultural resource;
- mitigation for visual impacts and noise for properties on Watling Street;
- community benefits;
- construction site security, use of local roadways during construction, short and long-term impacts due to road adjustments, maintenance of access roads, crime, duration of works, continuity of bridle and pedestrian paths, auto-transformer station, haul routes, CoCP, balancing ponds;
- tree removal/replacement, landscaping;
- height of viaduct over floodplain;
- future contamination of soil;
- catalyst of Proposed Scheme for future development;
- noise/vibration effects;
- light pollution;
- utility diversions (e.g. high pressure gas mains);
- impacts of alteration of existing roads and volumes;
- desire for rolling stock depot not to be located in Drayton Bassett;
- connection to the WCML;
- lowering of the watercourse and flood risk; and
- presence of ancient woodlands, environmental sites, bat foraging habitat area.

2.5.5 In addition to the engagement through the community forums, the draft Environmental Statement and Design Refinement consultations were launched on 16 May 2013 for a period of eight weeks and closed on 11 July 2013. As part of these consultations, members of local communities and other interested parties were notified, provided with information and invited to engage on issues pertinent to the draft Environmental Statement and the development of the scheme. Details of the local consultation events were provided on HS2 Ltd website, social media, posters at local venues, national and regional advertising and to properties within 1km of the

Proposed Scheme. In the Drayton Bassett, Hints and Weeford area consultations on the draft Environmental Statement and on the Design Refinement were held on 18 Jun 2013 at Hints Village Hall.

2.5.6 HS2 Ltd staff attended the events, including engineers and environmental specialists, for members of the public to speak to.

2.5.7 Responses from the draft Environmental Statement consultation have been analysed and an overview of those received and how the Environmental Statement has taken account of responses is contained in the Draft Environmental Statement Consultation Summary Report (Volume 5: Appendix CT-008-000).

## 2.6 Route section main alternatives

2.6.1 The main strategic alternatives considered in this area of the Proposed Scheme are presented in Volume 1 and in Volume 5: Appendix CT-002-000. The main local alternatives considered for the Proposed Scheme within this area are described in this section.

2.6.2 Since April 2012, as part of the design development process, a series of local alternatives has been reviewed within workshops attended by engineering, planning and environmental specialists. During these workshops, the likely significant environmental effects of each design option have been reviewed. The purpose of these reviews has been to ensure that the Proposed Scheme draws the appropriate balance between engineering requirements, cost and potential environmental impacts.

### Line raise between A5 and A51

2.6.3 The January 2012 announced route from the Black Brook valley to Whittington Heath Golf Club would run in a 3.8km-long cutting with an average depth over 12m. The January 2012 announced route is noted as Option A and is compared against the Proposed Scheme, which was considered as Option B.

2.6.4 Compared to Option B, which raises the route by up to approximately 8m, Option A would result in deeper cuttings along the route. The online alignment of the A5 would be lower. Between Brockhurst Lane and Watling Street, the route would be approximately 1m higher.

2.6.5 Option A would result in a slight decrease in woodland loss from Job's Hill Plantation compared to Option B, but an increased need for false cutting above the Black Brook valley along the east side in the same location. This, along with a higher viaduct over the Black Brook, would increase some impacts in the Hints area. Deeper and wider cuttings near Watling Street and the A5 and across farmland would increase landscape impacts, including increased loss of hedgerow and copse planting, although there would be slightly decreased loss of vegetation in some areas. The farmhouse at Packington Moor would be demolished in this option.

2.6.6 The A5 permanent on-line bridge would increase long-term impacts for some buildings at Buck's Head Farm and on Watling Street, similar to the Proposed Scheme. Land required for the scheme and the visible width of cutting would be increased past Horsley Brook Farm and Ingleyhill Farm. There would possibly be

greater demolition at Buck's Head Farm. There would be an increased risk to the principal aquifer from deeper excavation and increased need large-scale pumping during construction.

2.6.7 There would be an increased duration of excavation and of the A5 works. Cuttings would still provide noise attenuation for sensitive receptors. There would be increased land loss overall and substantially increased material from excavation. A greater amount of materials would be needed for bridges across cuttings.

2.6.8 There would be generally increased impacts from wider and deeper cuttings, higher viaduct and increased demolition, offset by locally decreased impacts from permanence the re-alignment of the A5 and decreased impacts at Job's Hill Plantation.

2.6.9 Option A would have a greater capital cost, and provide an increased construction impact, higher operational cost, require more land for construction, and maintain a broadly similar overall environmental impact during operation as the Proposed Scheme.

2.6.10 Therefore, Option B was taken forward for further development within the Proposed Scheme for the Bourne Valley to Whittington Heath Golf Club section of the route.

### Alternatives to increase line speed and mitigate impacts on commercial developments around Lichfield

2.6.11 Alternatives considered in CFA22 (Whittington to Handsacre) would have affected the route in this area. These include realignments to increase speed and other options to avoid impacts on the Fradley Business Park. Refer to Whittington to Handsacre CFA22 report for further details.

### Alternatives proposed by the Community

2.6.12 During the engagement process proposals were received from members of the Community for changes to the design. In this area the following alternatives were developed and compared against Option A, the January 2012 announced route.

2.6.13 Two options, Options B and C, were developed to address proposals that affected the design south of the A5 crossing.

2.6.14 Option B consisted of a green tunnel approximately 3.8km long, from a point to the south of the A453 Sutton Road crossing to a point north of Brockhurst Lane, Hints. To mask the green tunnel and reconnect severed watercourses, it would be necessary to lower the alignment in conjunction with this.

2.6.15 Option C included a shorter length of green tunnel approximately 800m long starting to the south of Roundhill Wood and finishing to the north of the Brockhurst lane crossing. The alignment would have been lowered several metres to mask the green tunnel within the landscape.

2.6.16 Option B would triple the relative cost of this section, whilst Option C would increase the cost by approximately 50%. Option B would have provided some environmental benefits (most notably landscape improvement) over Option A, but increased many of the impacts during construction and those impacts relating to energy use during operation. The overall environmental benefits of Option C would have been reduced

by the need to provide a crossing for Brockhurst Lane, the re-provision of which would have increased some of the environmental impacts compared to Option A. Overall, the minor environmental improvement of option B and neutral environmental assessment of Option C would not have supported the additional expenditure required to achieve these benefits.

2.6.17 Of the proposals received for alternatives to the north of the A5 crossing, four options were developed (Options D, E, F and G).

2.6.18 Option E consisted of a green tunnel from the A5 to the A51 Tamworth Road, using the natural topography to form the tunnel portals. In order to bury the structures, the alignment would have been lowered by approximately 6m. Due to the length of the tunnel, an access shaft would have been needed to be located off of Flats Lane at about the tunnels mid-point. Due to the central dividing wall of a twin track tunnel, it would have been necessary for the alignment approaching the tunnel to have a slightly wider footprint than Option A.

2.6.19 A bored tunnel with a similar length as Option E was considered as Option D. The separation of the tunnels would have required a wider footprint than Option A to the north and south of the tunnels.

2.6.20 A design for a 400m-long green tunnel was developed as Option F. The tunnel would have extended to either side of the residential area at the crossing of Flats Lane and Knox's Grave Lane. This option could have been located to the east or west of the existing alignment.

2.6.21 A similar Option G was proposed using a bored tunnel in the same location as Option F. The separation of the tunnels would have required a wider footprint than Option A on the approaches to the tunnel.

2.6.22 Whilst options for bored tunnels (Options D and G) may have been technically feasible, the alignment would have needed to be lowered to provide sufficient depth for tunnelling. Similar environmental benefits would have been obtained from a green tunnel in the same section, as considered in Options D and F. The additional construction cost of a bored tunnel over the costs of an alternative green tunnel in this section would have been substantial, and this option was therefore not considered further.

2.6.23 Of the options proposed north of the A5, Option E would have tripled the relative cost of this section, whilst Option F would have increased the cost by approximately 50%. Option E would have provided some environmental benefits (most notably landscape improvement) over Option A, but increased many of the impacts during construction and those impacts relating to energy use during operation. The short length of green tunnel provided in Option F would have generally provided long-term environmental benefits, but with increased construction impacts and increased environmental impacts related to energy use. Overall, the minor environmental improvement of Option E and neutral environmental assessment of Option F did not support the additional expenditure required to achieve these benefits.

# 3 Agriculture, forestry and soils

## 3.1 Introduction

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

3.1.2 The quality of agricultural land in England and Wales is assessed according to the Agricultural Land Classification (ALC) system, which classifies agricultural land into five grades from excellent quality Grade 1 land to very poor quality Grade 5 land. Grade 3 is subdivided into Subgrades 3a and 3b. The main issue in the assessment of the impacts on agricultural land is the extent to which land of best and most versatile (BMV) agricultural quality (Grades 1, 2 and 3a) is affected by the Proposed Scheme.

3.1.3 Forestry is considered as a land use feature and the impacts have been calculated quantitatively. The qualitative effects on forestry land and woodland are addressed principally in the ecology and landscape and visual assessments (see Sections 7 and 9).

3.1.4 Soil attributes, other than for food and biomass production, are identified in this section but the resulting function or service provided is assessed in other sections, notably cultural heritage, ecology and landscape and visual assessment (see Sections 6, 7 and 9).

3.1.5 The main issue for farm holdings is the disruption by the Proposed Scheme of the physical structure of agricultural holdings and the operations taking place upon them, during both its construction and operational phases. Key engagement has been undertaken with farmers and landowners affected by the Proposed Scheme to obtain factual information on the scale and nature of the farm and forestry operations and related farm-based uses.

3.1.6 Details of published and publically available information used in the assessment, and the results of surveys undertaken within this CFA, are contained in Volume 5: Appendix AG-001-021.

## 3.2 Scope, assumptions and limitations

3.2.1 The assessment scope, key assumptions and limitations for the agriculture, forestry and soils assessment are set out in Volume 1, the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

3.2.2 The study area for the agriculture, forestry and soils assessment covers all of the land that will be required for the construction and operation of the Proposed Scheme. The resources and receptors that are assessed within this area are agricultural land, forestry land and soils; together with farm and rural holdings. The assessments of the

impacts on agricultural land quality and forestry land are made with reference to the prevalence of BMV land and forestry in the general locality, taken as 2km either side of the centre line of the Proposed Scheme.

3.2.3 Common assumptions that have been applied to the Proposed Scheme, such as the restoration of agricultural land to pre-existing quality, the handing back of land used temporarily to the original landowner and the non-replacement of capital items demolished, are set out in Volume 1. There are no assumptions or limitations that are specific to the assessment in this CFA.

## 3.3 Environmental baseline

### Existing baseline

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

#### *Soils and land resources*

**Topography and drainage**

3.3.2 The main topographical features within the study area are described in detail in Section 9, Landscape and visual assessment. The proposed route extends from just south of the Marl Pit and the county boundary in the south of the study area, rising from 80m above Ordnance Datum (AOD) to 110m AOD at the A453 Sutton Road. The route continues on the flank of the deeply dissected Pebble Beds Hills south-west of Hints at 90m to 110m AOD as far as the A5, and then runs north along a low watershed with undulating topography between 90m and 110m AOD, as far as the A51 Tamworth Road at Whittington Heath.

3.3.3 South of the A5, drainage is provided by several brooks, the largest of which are the Black-Bourne Brook and Gallows Brook, rising on the outskirts of Sutton Coldfield in the west and flowing towards the lower River Tame. North of the A5 there is a stream flowing eastwards and then northwards past Freeford Manor towards the lower Tame.

**Geology and soil parent materials**

3.3.4 The main geological features are described in detail in Section 8, Land quality and are summarised in Volume 5: Appendix AG-001-021.

3.3.5 Superficial deposits are sparse along the Proposed Scheme. River Alluvium, comprising clay, silt, sand and gravel, is located south of Oak Dairy Farm and is associated with an area of floodplain at Gallows Brook. River Alluvium is also located on the floodplain of Black-Bourne Brook.

3.3.6 Superficial deposits of glacial till are located in two areas along the Proposed Scheme; between Shirrall Hall Farm and the A453 Sutton Road and in an isolated pocket at Defence Medical Services (DMS) Whittington (Whittington Barracks).

3.3.7 The Mercia Mudstone Group underlies the Proposed Scheme almost as far north as Roundhill Wood, and is described as red and green-grey mudstones and subordinate

siltstones with widespread thin beds of gypsum and anhydrite. Sandstones, mudstones and conglomerate of the Enville Member underlie the Proposed Scheme between Roundhill Wood and Black-Bourne Brook with intermittent outcrops of the Hopwas Breccia Formation, described as interbedded breccia and sandstone. North of Black Brook to the end of the study area, the overlying bedrock comprises sandstones and conglomerate of the Kidderminster Formation and pebbly sandstones of the Bromsgrove Sandstone Formation.

### Description and distribution of soil types

3.3.8 The characteristics of the soils are described by the Soil Survey of England and Wales[6] and shown on the National Soil Map[7]. More detailed published information is also available for part of the study area[8]. The soils are grouped into eight associations of a range of soil types and are described in more detail in Volume 5: Appendix AG-001-021, and their distribution is shown on Volume 5: Map Book – Agriculture, forestry and soils, Maps AG-01-059 through AG-01-061a.

3.3.9 The Bromsgrove association is mapped south of Hints between Canwell Hall and the Bourne Brook. The principal soil types are permeable, free-draining reddish light loams over sandstone, deep in places (Wetness Class I)[9] There are also some light and medium loams with slowly permeable subsoils of siltstone and sandstone that experience slight seasonal waterlogging (Wetness Class I). Similarly, the Bridgnorth association has well-drained sandy and light loamy soils over soft, pebbly sandstones, deep in places (Wetness Class I). It occurs northwards to the boundary of the study area from where the route crosses the A5 between Hints and Weeford.

3.3.10 Land each side of the Black and Bourne Brooks at Hints has soils of the Goldstone association of light, free-draining, very stony, acid soils over conglomerate and sandstone (Wetness Class I).

3.3.11 Whimple 3 association is mapped on land overlying reddish mudstones to the north of Gallows Brook in the south of the study area. A thin drift cover gives loamy or silty topsoils and upper subsoils. The soils experience slight seasonal waterlogging on upper slopes (Wetness Class II), but on lower slopes and in hollows soils are seasonally waterlogged (Wetness Class III).

3.3.12 Land north of the A453 Sutton Road, as far as White House Farm, has soils of the Brockhurst 1 association developed on mudstones with thin superficial drift. Topsoils and upper subsoils are loamy or silty, but the slowly permeable clayey lower subsoils cause the dominant soils to be seasonally waterlogged for long periods over the winter (Wetness Class IV).

3.3.13 A tract of land south of the A453 Sutton Road has soils of the Clifton association in deep, reddish light and medium loamy drift. Subsoils are slowly permeable, so that most soils are seasonally waterlogged (Wetness Class IV). Similar soils that experience

[6] National Soil Resources Institute (1999), *Land Information System*. Cranfield University.
[7] Cranfield University (2001), *The National Soil Map of England and Wales* 1:250,000 scale. National Soil Resources Institute, Cranfield University, UK.
[8] Hollis, John (2001), Soils in Staffordshire IV Sheet SK00/10 (Lichfield); Rothamsted Experimental Station.
[9] The Wetness Class (WC) of a soil is classified in Appendix II of Hodgson, J.M. (1977) The Soil Survey Field Handbook. Soil Survey and Land Research Centre, Technical Monograph No.5, according to the depth and duration of waterlogging in the soil profile and has six bands ranging from Wetness Class I (well drained) to Wetness Class VI (permanently waterlogged).

only slight seasonal waterlogging occur on shedding sites with natural run-off (Wetness Class III).

3.3.14 Soils in parts of the Black Brook valley are mapped as the Wigton Moor association in deep loamy drift deposits and sandy and gravelly alluvial soils that are variably affected by groundwater (Wetness Class III).

3.3.15 A small valley head around Moor Covert, south of Packington Moor, contains the Isleham association of deep permeable sandy and peaty soils affected by groundwater (Wetness Class I or II where the land is cultivated and drained, or IV where the land is unimproved).

### *Soil and land use interactions*

#### Agricultural land quality

3.3.16 The principal soil/land use interaction in the study area is the quality of the agricultural land resource. The ALC is based on the identification of physical limitations to the agricultural capability of land resulting from the interactions of soil, climate and the site.

3.3.17 The main soil properties which affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility. There are four distinct soil characteristics within the area which are the well-drained, light loams and sandy soils of the Bromsgrove and Bridgnorth associations; well-drained but acidic, light loamy soils in the Goldstone association; light and permeable soil variably affected by groundwater in the Wigton Moor and Isleham associations; and soils with slowly permeable subsoils and which are seasonally waterlogged, in the Whimple, Clifton and Brockhurst 1 associations.

3.3.18 Climate in this part of England does not in itself place any limitation upon land quality but the interactions of climate with soil characteristics are important in determining the wetness and droughtiness limitations of the land. The influence of climate on soil wetness is assessed by reference to median field capacity days (FCD) when the soil moisture deficit is zero, soil WC and topsoil texture. Droughtiness is determined by comparing the available water capacity of the soil, adjusted for the crop, with the moisture deficit for the locality for two crops; winter wheat and potatoes.

3.3.19 The local climatic factors have been interpolated from the Meteorological Office's standard 5km grid point dataset at two points within the community forum area, set out in Appendix 5: Appendix AG-001-021. FCDs range from 150 to 151 days, around the average for lowland England (150 days). This is considered to be quite favourable for providing opportunities for agricultural cultivations and soil handling.

3.3.20 Gradient and microrelief are not limiting in this area. Whilst there is potential for flooding in the floodplains of the Black-Bourne Brook in the north and Gallows Brook area in the south, no agricultural land within the study area is known to be limited by the frequency and/or duration of flood risk during summer or winter.

3.3.21 The assessment of site factors is primarily concerned with the way in which topography influences the use of agricultural machinery and, hence, the cropping potential of land. Gradient and micro relief, with complex changes of slope angle or direction over short distances, are not considered limiting in the study area, except on

the steep hillsides south of Hints, where the land is in Grade 4. Flooding may occur on some narrow floodplains of brooks (such the Black-Bourne Brook in the north and Gallows Brook area in the south) but it's very small extent and limited frequency means it is not significant in terms of ALC.

3.3.22 The principal limiting factors determining agricultural land quality in this area are soil wetness and soil droughtiness. Overall, the assessment of agricultural land required for constructing and operating the Proposed Scheme indicates that 81% is in the best and most versatile (BMV) category, predominantly in Subgrade 3a (55%) with a smaller proportion of Grade 2 (26%). Grade 2 mainly occurs south of Streethay and south-east of Handsacre on sandy loam soils of the Bromsgrove and drained parts of the Blackwood associations. Subgrade 3a is widespread in the area where stone content, topsoil texture and WC affect the grading, as described in more detail in Volume 5: Appendix AG-001-021.

3.3.23 The remaining agricultural land is lower quality Subgrade 3b (16%) and Grade 4 (3%). The Subgrade 3b is found on the heavier, more clayey land (Clifton and Brockhurst 1 associations) west of Huddlesford and Hilliard's Cross. The Grade 4 occurs on steep hillsides south of Hints. Full details of the ALC are provided in Volume 5: Appendix AG-001-021 and the ALC grading is shown on Volume 5: Map Book – Agriculture, forestry and soils, Maps AG-01-059 to AG-01-061a.

3.3.24 Department for Environment, Food and Rural Affairs (Defra) mapping[10] shows that there is generally a high likelihood of encountering BMV land in the locality, which makes such land a resource of low sensitivity in this study area.

3.3.25 Department for Environment, Food and Rural Affairs (Defra) mapping[11] shows that there is generally a high likelihood of encountering BMV land in the locality, which makes such land a resource of low sensitivity in this CFA.

### Other soil interactions

3.3.26 Soil fulfils a number of functions and services for society in addition to those of food and biomass production which are central to social, economic and environmental sustainability. These are outlined in sources such as the Soil Strategy for England[12] and The Natural Choice: securing the value of nature[13], and include:

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

[10] Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land.*
[11] Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land.*
[12] Defra (2009), *Soil Strategy for England.*
[13] Defra (2011), *The Natural Choice: securing the value of nature.*

3.3.27 Forestry resources represent a potentially multifunctional source of productive timber, landscape amenity, biodiversity and carbon storage capacity. The value and sensitivity of the resources are assessed in Section 7, Ecology.

3.3.28 The floodplain of the tributaries of the River Tame which are classed as ordinary watercourses and Black-Bourne Brook, which is classed as a Main River, represents the functional flood environment, as set out in Section 13, Water resources and flood risk assessment. Flood zone mapping available from the Environment Agency shows there to be a significant risk of flooding within these areas with the soils functioning as water stores for flood attenuation, as well providing a habitat for ecology.

3.3.29 The presence of soil-borne cultural assets within the study area is detailed in Section 6, Cultural heritage. These include prehistoric and Romano-British remains, such as crop marks of pit alignments, enclosures and linear features, to the north of Hints. Post-medieval cultural heritage assets and features are the most common, comprising the remains of field boundaries and land management of the 17th century onward.

### *Land use*

#### Land use description

3.3.30 Agricultural land use in the study area is dominated by arable crops, such as winter wheat, barley and oil seed rape. These types of arable crops are common on heavy (clayey) land of good to moderate quality in the Midlands. Spring-sown arable crops, field-scale vegetables and potatoes are often included in the rotations on lighter soils, such as Bromsgrove and Bridgnorth associations. Grassland for stock rearing (principally sheep and cattle) is also widespread and many farms are mixed arable and livestock enterprises.

3.3.31 A number of environmental designations potentially influence land use within the study area. The whole area is a nitrate vulnerable zone (NVZ), which is an area in which nitrate pollution is a potential problem. Statutory land management measures apply which seek to reduce nitrogen losses from agricultural sources to water. Some agricultural land is also subject to management prescriptions associated with the Environmental Stewardship Scheme which seeks either generally (the Entry Level Scheme) or specifically (the Higher Level Scheme) to retain and enhance the landscape and biodiversity qualities and features of farm land. Holdings which have land entered into an agri-environment scheme are identified in Table 8.

3.3.32 Woodland is quite common over the area, especially around Hints. Stands of woodland often occur on the steeper slopes with thin, very acid soils, such as Job's Hill, Rookery and Roundhill Wood between Hints and Weeford. Woodland covers 11% of land in the study area, which is just above the national average of 10%. Therefore, woodland in this area is a resource of low sensitivity.

#### Number, type and size of holdings

3.3.33 There are 23 holdings in the study area, as set out in Table 8. Four are general cropping enterprises producing cereals, field-scale vegetables and potatoes; eight are mixed arable and livestock farms (including one organic dairy herd at Freeford Manor); five specialise in livestock and one is given over to arable production. The remaining five are commercial equestrian businesses. The holdings range in size from

just over 3ha to 1,041ha. Larger holdings tend to be arable or general cropping enterprises; smaller holdings are given over to stock or equestrian services.

3.3.34 As shown in Table 8, ten holdings have diversified enterprises, with six running more than one line of diversification. The most popular diversification is equestrian services (three farms). Other services include commercial and residential lets; agricultural contracting services; a farm shop and a wedding venue. In the study area, nine holdings are assessed as being more sensitive to change than others: the organic dairy farm at Freeford Manor (CFA21/15); four holdings which are irrigated (CFA21/1, Brook Farm; CFA21/11, Buck's Head Farm; CFA/21/12, Streetway Farm and CFA21/13, Packington Moor) and equestrian enterprise at Horsley Brook, New House, Holt and Farms and Brockhurst Stables (CFA21/14, CFA21/21, CFA21/22 and CFA21/24). The boundaries of the holdings are on shown in Volume 5: Map Book – Agriculture, forestry and Soils, Maps AG-01-059 through AG-01-061a).

3.3.35 Table 8 sets out the sensitivity of individual holdings to change, which is determined by the extent to which they have the capacity to absorb or adapt to impacts, which in turn is determined primarily by their nature and scale. In general terms, larger holdings have a greater capacity to change enterprise mix and scale, can better absorb impacts and so are less sensitive. Units that rely on the use of buildings (such as intensive livestock and dairy farms, and horticultural units) are less able to accommodate change and have a higher sensitivity. Smaller (less intensively used) units, such as pony paddocks associated with residential properties, have a low sensitivity. The holding/reference name provides a unique identifier and relates to Maps AG-01-59 to AG-01-061a, given in Volume 5.

Table 8: Summary characteristics of holdings

| Holding reference/name | Holding type | Holding size (ha) | Diversification | Agri-environment | Sensitivity to change |
|---|---|---|---|---|---|
| CFA21/1 Brook Farm (Portleys Lane) | General cropping (cereals and potatoes) | 114.5 | Equestrian services (commercial), game shooting | ELS | High |
| CFA21/2 South View Farm | Mainly livestock (suckler cows) | 6.9 | Solar cells, caravan site | None | Medium |
| CFA21/3 Wiggins Hill Farm | Mainly arable | 323.8 | Agricultural contracting | ELS and HLS | Medium |
| CFA21/4 Cranebrook | Mixed arable and livestock | 19.4 | No diversified activities | None | Low |
| CFA21/5 Draytonlane End Farm | Mainly arable and some grassland | 37.2 | Equestrian services (commercial), residential let, storage | ELS and HLS | Medium |
| CFA21/6 Brook Farm (Bangley Lane) | Mainly arable and livestock | 451.2 | Agricultural contracting, equestrian services (commercial), educational services | ELS and HLS | Medium |
| CFA21/8 Canwell Park | Mainly arable and some grassland | 1041.0 | No diversified activities | ELS | Medium |
| CFA21/9 Rookery Farm | Mainly grassland and some arable | 50.6 | Residential let | ELS | Medium |

| Holding reference/name | Holding type | Holding size (ha) | Diversification | Agri-environment | Sensitivity to change |
|---|---|---|---|---|---|
| CFA21/10* Home Farm | Mainly livestock (Sheep) | 103.2 | No known diversified activities | ELS | Medium |
| CFA21/11 Buck's Head Farm | General cropping (cereals and potatoes) | 180.0 | Commercial let, residential let | ELS | High |
| CFA21/12* Streetway Farm | General cropping (cereals and potatoes) | 242.8 | No known diversified activities | ELS | High |
| CFA21/13 Packington Moor | General cropping (cereals and potatoes) and livestock | 250.9 | Wedding Venue Farm Shop | ELS | High |
| CFA21/14* Horsley Brook Farm | Equestrian (commercial) | 66.0 | No diversified activities | ELS | High |
| CFA21/15 Freeford Manor | Mixed arable and livestock (including dairy) | 402.7 | No diversified activities | ELS | High |
| CFA21/17* Oak Dairy Farm | Mainly grassland and some arable | 24.2 | No known diversified activities | None | Medium |
| CFA21/18 Shirrall Hall Farm | Mainly livestock (Sheep) | 18.6 | No diversified activities | None | Medium |
| CFA21/19 Hudson's Equestrian Unit | Equestrian (commercial) | 23.5 | No diversified activities | None | Medium |
| CFA21/20* Oak Tree Farm | Mainly livestock (suckler cows) | 23.9 | No know diversified activities | None | Medium |
| CFA21/21* New House Farm | Equestrian (commercial) | 17.0 | Residential let | None | High Equestrian |
| CFA21/22* Holt Farm | Equestrian (commercial) | 3.3 | No diversified activities identified | None | High Equestrian |
| CFA21/23* Bourne Brook Farm | Mixed arable and livestock | 35.1 | Equestrian (commercial); commercial units; trading; fishery | ELS and HLS | Medium |
| CFA21/24* Brockhurst Stables | Equestrian (commercial) | 11.0 | No diversified activities identified | None | High Equestrian |
| CFA21/25* Land east of Brockhurst Lane | Mainly livestock (cattle and sheep) | 16.7 | No diversified activities identified | None | Medium |

* No farm impact assessment interview conducted; data estimated.

## Future baseline

### *Construction (2017)*

3.3.36 Volume 5: Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. No committed developments have been identified in this area that will materially alter the baseline conditions in 2017 for agriculture, forestry and soils.

3.3.37 The future of agri-environment schemes is uncertain at present due to on-going reform of the European Union Common Agricultural Policy. The majority of schemes seem likely to cease over the next two to three years and replacements are uncertain. Whilst this will remove a level of support from the agricultural industry that has been used to offset some of the costs incurred in managing land in an environmentally responsible manner, it is unlikely to materially alter the way agricultural land is managed in the future. Whilst some field margins may be cropped closer to hedgerows and stocking rates may increase in some locations, the stocking and cropping baseline set out in the previous section is unlikely to change significantly.

### *Operation (2026)*

3.3.38 No committed developments have been identified in this local area that will materially alter the baseline conditions in 2026 for agriculture, forestry and soils.

## 3.4 Effects arising during construction

### Avoidance and mitigation measures

3.4.1 Compliance with the draft Code of Construction Practice (CoCP) (Volume 5: Appendix CT-003-000/1) will avoid or reduce environmental impacts during construction. Of particular relevance to agriculture, forestry and soils are the following measures:

- the reinstatement of agricultural land which is used temporarily during construction to agriculture, where this is the agreed end use;
- the provision of a method statement for stripping, handling, storing and replacing agricultural and woodland soils to reduce risks associated with soil degradation on areas of land to be returned to agriculture and woodland following construction, based on detailed soil survey work to be undertaken prior to construction. This will include any remediation measures necessary following the completion of works;
- a requirement for contractors to monitor and manage flood risk and other extreme weather events which may affect agriculture, forestry and soil resources during construction;
- arrangements for the maintenance of farm and field accesses affected by construction;
- the protection and maintenance of existing land drainage and livestock water supply systems, where practicable;
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing;
- the adoption of measures to control the deposition of dust on adjacent agricultural crops;
- the control of invasive and non-native species; and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land;

- the adoption of measures to prevent, as far as reasonably practicable, the spread of soil-borne, crop and animal diseases from the construction area; and
- liaison and advisory arrangements with affected landowners, occupiers and agents, as appropriate.

3.4.2 During the development of the design, measures have been incorporated to avoid or mitigate severance impacts on agriculture, forestry or soils during construction. Access across the Hs2 alignment for agricultural vehicles will be provided by:

- overbridges at Drayton Lane, the A453 Sutton Road, Bangley Lane, Watling Street, the A5, Flats Lane and the A51 Tamworth Road have been designed with sufficient clearance to allow their use by agricultural traffic;
- Lichfield Road underbridge has been designed with sufficient clearance to allow its use by agricultural traffic; and
- an underpass at Brockhurst Lane which allows movement of small agricultural vehicles underneath.

3.4.3 In addition, there is a need to avoid or reduce environmental impacts to soils during construction. It is an essential element of the construction process that the soil resources from the areas required temporarily and permanently are stripped and stored so that land required temporarily for construction purposes which is currently in agricultural use can be returned to that use, where agreed, and to its pre-existing agricultural condition.

3.4.4 Subject to the adoption of good practice techniques in handling, storing and reinstating soils on land where agricultural or forestry uses are to be resumed, there will be no reduction in the long-term capability which would downgrade the quality of disturbed land. Some land with heavier textured soils may require careful management during the aftercare period to ensure this outcome.

## Assessment of impacts and effects

3.4.5 The cessation of existing land uses will be required not only on the land on which permanent works will be sited, but also on the land used temporarily to facilitate the construction of those permanent works.

3.4.6 The land required for the Proposed Scheme and for its construction will, in places, sever and fragment individual fields and operational units of agricultural and forestry land. This will result in potential effects associated with the ability of affected agricultural interests to continue to access and effectively use residual parcels of land. There may also be the loss of, or disruption to, buildings and operational infrastructure such as drainage. The scheme design seeks, however, to minimise this structural disruption, and to incorporate inaccessible severed land as part of environmental mitigation works. Structural disruption is disruption to the existing structure of farm holdings principally from severance and the loss of key farm infrastructure.

3.4.7 The timing and duration of various construction elements are set out in Section 2.3. Where land is restored to agricultural use it will be subject to a further period of five

years of managed aftercare to ensure stabilisation of the soil structure, where appropriate.

3.4.8 Land used for the construction of the Proposed Scheme will fall into a number of categories when work is complete, as follows:

- part of the operational railway and kept under the control of the operator;
- returned to agricultural use (with restoration management);
- used for drainage or flood compensation which may also retain some agricultural use; or
- used for ecological mitigation.

### *Temporary effects*

#### Impacts on agricultural land

3.4.9 During the construction phase, the total area of agricultural land used will be 222.5ha as shown in Table 9. Of this total, 56.9ha will be restored and available for agricultural use following construction.

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

| Agricultural land quality | Area required (ha) | Percentage of agricultural land | Area to be restored (ha) |
|---|---|---|---|
| Grade 1 | 0.0 | 0% | 0.0 |
| Grade 2 | 53.8 | 24% | 10.4 |
| Subgrade 3a | 130.6 | 59% | 40.2 |
| BMV SUBTOTAL | 184.4 | 83% | 50.6 |
| Subgrade 3b | 32.7 | 15% | 6.2 |
| Grade 4 | 5.4 | 2% | 0.1 |
| Grade 5 | 0.0 | 0% | 0.0 |
| TOTAL AGRICULTURAL LAND | 222.5 | 100% | 56.9 |

3.4.10 The disturbance during construction to 184.4ha of land of BMV quality is assessed as an impact of high magnitude, comprising more than 60% of the overall agricultural land requirement. Considering BMV land in this local area is a receptor of low sensitivity, the effect on BMV land is assessed as a moderate adverse effect of the Proposed Scheme, which is significant.

3.4.11 Following completion of the construction project, all temporary facilities will be removed and the topsoil and subsoil will be reinstated in accordance with the agreed end use for the land. Overall, it is estimated that there will not be any significant surplus of topsoil or subsoil material arising from the Proposed Scheme in the area. If surplus soils are generated, they will be used where land is to be restored to agriculture or other uses with slightly thicker topsoil and subsoil layers, where appropriate.

### Nature of the soil to be disturbed

3.4.12 The sensitivity of the soils is greatest in relation to those which will be disturbed by construction activity and returned to an agricultural or other rural land-based use upon completion of the Proposed Scheme. The quantum of each disturbed soil type is less important than the sensitivity of particular soils to the effects of handling during construction and reinstatement of land.

3.4.13 Successful soil handling is dependent upon movements being undertaken under appropriate weather and ground conditions using the appropriate equipment. The principles of soil handling are well established and set out in advisory material such as Defra's Code of Practice for the Sustainable Use of Soils[14]. These principles will be followed throughout the construction period. The heavier (silty and clayey) and seasonally waterlogged Whimple and Brockhurst 1 associations are least able to remain structurally stable when moved in wet conditions or by inappropriate equipment. They are susceptible to compaction and smearing which could impede successful reinstatement.

### Impacts on holdings

3.4.14 Land may be required from holdings both permanently and temporarily (i.e. the latter just during the construction period). In most cases, the temporary and permanent land requirement will occur simultaneously at the start of the construction period and it is the combined effect of both that will have the most impact on the holding. In due course some agricultural land will be restored and the impact on individual holdings will be reduced, but the following assessment focuses on the combined effect during the construction phase. The residual permanent effects are described at the end of this section.

3.4.15 The effects of the Proposed Scheme on individual agricultural and related interests during the construction period are summarised in Table 10. This table shows the total area of land required on a particular holding in absolute terms and as a percentage of the total area farmed. It also shows the area of land that will be returned to the holding following the construction period. The scale of effect is based on the proportion of the holding required rather than the absolute area of land. The holding/reference name provides a unique identifier and relates to Maps AG-01-059 to Map AG-01-61a (Volume 5).

3.4.16 The effects of severance during construction are judged on the ease and availability of access to severed land. For the most part these will be same during and post construction but occasionally they will differ between the two phases. The disruptive effects, principally of construction noise and dust, are assessed according to their effects on land uses and enterprises. Full details of the nature and significance of effects are set out in Volume 5: Appendix AG-001-021. Where the total sum of the land required by ALC grade (as shown in Table 7) differs from the total sum of the land required by holding (as shown in Table 8), the difference is because some holdings are affected in more than one CFA and some holdings include non-agricultural land. The combined impact on holdings is reported once in the CFA where the main holding is located.

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

Table 10: Summary of temporary construction effects on holdings

| Holding reference/name | Total area required | Construction severance | Disruptive effects | Scale of construction effect | Area to be restored |
|---|---|---|---|---|---|
| CFA21/1<br>Brook Farm | 10.5ha – 9%<br>Low | Negligible | Negligible | Moderate adverse | 2.5ha |
| CFA21/2<br>South View Farm | 2.2ha – 32%<br>High | Negligible | Medium | Major/Moderate adverse | 0.0ha |
| CFA21/3<br>Wiggins Hill Farm | 11.4ha – 4%<br>Negligible | Negligible | Negligible | Negligible | 2.7ha |
| CFA21/4<br>Cranebrook | 12.7ha – 65%<br>High | Negligible | Negligible | Moderate adverse | 0.1ha |
| CFA21/5<br>Draytonlane End Farm | 12.3ha – 33%<br>High | Medium | Medium | Major/Moderate adverse | 4.3ha |
| CFA21/6<br>Brook Farms | 37.8ha – 8%<br>Low | Medium | Low | Moderate adverse | 22.5ha |
| CFA21/8<br>Canwell Park | 6.8ha – 1%<br>Negligible | Negligible | Negligible | Negligible | 2.0ha |
| CFA21/9<br>Rookery Farm | 2.4ha – 5%<br>Negligible | Negligible | Negligible | Negligible | 0.5ha |
| CFA21/10*<br>Home Farm | 29.9ha – 29%<br>High | Medium | Negligible | Major/Moderate adverse | 0.1ha |
| CFA21/11<br>Buck's Head Farm | 23.4ha – 13%<br>Medium | High | Low | Major adverse | 3.4ha |
| CFA21/12*<br>Streetway Farm | 9.9ha – 4%<br>Negligible | Medium | Negligible | Major/Moderate adverse | 0.2ha |
| CFA21/13<br>Packington Moor | 13.0ha – 5%<br>Low | Medium | Low | Major/Moderate adverse | 0.4ha |
| CFA21/14<br>Horsley Brook Farm | 26.2ha – 40%<br>High | Negligible | Medium | Major adverse | 0.7ha |
| CFA21/15<br>Freeford Manor | 29.5ha – 7%<br>Low | Medium | Negligible | Major/Moderate adverse | 9.5ha |
| CFA21/17*<br>Oak Dairy Farm | 10.2ha – 42%<br>High | Medium | Low | Major/Moderate adverse | 1.0ha |
| CFA21/18<br>Shirrall Hall Farm | 1.1ha – 6%<br>Low | Negligible | Negligible | Minor adverse | 0.4ha |
| CFA21/19<br>Hudson's Equestrian Unit | 3.9ha – 17%<br>Medium | Negligible | Negligible | Major/Moderate adverse | 0.2ha |
| CFA21/20*<br>Oak Tree Farm | 0.1ha – 0%<br>Negligible | Negligible | Negligible | Negligible | 0.0ha |
| CFA21/21*<br>New House Farm | 0.1ha – 1%<br>Negligible | Low | Negligible | Moderate adverse | 0.1ha |
| CFA21/22*<br>Holt Farm | 1.7ha – 52%<br>High | Negligible | Negligible | Major adverse | 1.7ha |

| Holding reference/name | Total area required | Construction severance | Disruptive effects | Scale of construction effect | Area to be restored |
|---|---|---|---|---|---|
| CFA21/23*<br>Bourne Brook Farm | 7.4ha – 21%<br>High | Low | Negligible | Major/Moderate adverse | 7.4ha |
| CFA21/24*<br>Brockhurst Stables | 3.0ha – 16%<br>Medium | Low | Negligible | Moderate adverse | 3.0ha |
| CFA21/25*<br>Land east of Brockhurst Lane | 6.5ha – 39%<br>High | Low | Negligible | Major/Moderate adverse | 6.5ha |

* No farm impact assessment interview conducted; data estimated.

3.4.17 The effects of temporary severance during construction are judged on the ease and availability of access to severed land. The disruptive effects, principally of construction noise and dust, are assessed according to their effects on land uses and enterprises. Full details of the nature and significance of effects are set out in Volume 5: Appendix AG-001-021.

3.4.18 Overall, it is considered that 18 holdings will experience major or moderate temporary adverse effects during construction, which are significant. Of these, the temporary effects on five holdings (CFA21/21, CFA21/22, CFA21/23, CFA21/24 and CFA21/25) area associated with land required for a wayleave, or similar, and the actual amount of land taken out of agricultural production temporarily is likely to be minimal and/or the effect will only be short term; therefore, the scale of effect is a 'worst case'. Most enterprises experiencing a major or moderate effect do so because a high proportion of the holding is required for construction. Severance is the other key trigger for major or moderate temporary adverse effect on holdings.

### Cumulative effects

3.4.19 No significant cumulative effects on agriculture, forestry and soils have been identified for the construction of the Proposed Scheme.

## *Permanent effects*

### Impacts on agricultural and forestry land

3.4.20 Land used for the construction of the Proposed Scheme will fall into a number of categories when work is complete, as follows:

- part of the operational railway and kept under the control of the operator;
- returned to agricultural use (with restoration management);
- used for drainage or flood compensation which may also retain some agricultural use; or
- used for ecological and landscape mitigation.

3.4.21 Following construction and restoration, the area of agricultural land that will remain permanently required will be 165.6ha, as shown in Table 11.

Table 11: Agricultural and forestry land required permanently

| Agricultural land quality | Total area required (ha) | Percentage of agricultural land |
|---|---|---|
| Grade 1 | 0.0 | 0% |
| Grade 2 | 43.4 | 26% |
| Subgrade 3a | 90.4 | 55% |
| BMV SUBTOTAL | 133.8 | 81% |
| Subgrade 3b | 26.5 | 16% |
| Grade 4 | 5.3 | 3% |
| Grade 5 | 0.0 | 0% |
| TOTAL AGRICULTURAL LAND | 165.6 | 100% |
| Forestry land | 8.1 | n/a |

3.4.22 The permanent loss of 133.8ha of land of BMV quality is assessed as an impact of high magnitude, comprising more than 60% of the overall agricultural land requirement. As stated previously, BMV land in this area is a receptor of low sensitivity so that the permanent effect on BMV land is assessed as a moderate adverse effect of the Proposed Scheme, which is significant.

3.4.23 Areas proposed for ecological and landscape mitigation, which will be removed from mainstream agricultural production, include land at Cranebrook (CFA21/4) and new woodland planting between Rookery and Job's Hill Plantation, plus enhancement of meadow grassland along the Black Brook at Home Farm (holding CFA21/10). There will also be some new heathland planting at Horsley Brook Farm (CFA21/14).

3.4.24 Areas engineered to provide additional flood compensation capacity will be subject to marginal downgrading in land quality and will be limited in extent to land under the Black Brook Viaduct on Buck's Head Farm (holding CFA21/11).

3.4.25 Areas of woodland that will be permanently affected include woodland on the steeper slopes with thin, very acid soils, such as Job's Hill, Rookery and Roundhill Wood between Hints and Weeford. Overall, the total amount of forestry land required to implement the Proposed Scheme will be 8.1ha, out of a total permanent land requirement of 193.8ha (4%), which is a low impact. As the extent of the forest cover in the study area is higher than the average national woodland cover, making it resource of low sensitivity, the quantitative loss of woodland will be negligible. The qualitative assessment of loss is addressed in other relevant sections.

### Impacts on holdings

3.4.26 The permanent effects of the Proposed Scheme on individual agricultural and related interests is summarised in Table 12. The land required column refers to the area of land permanently required to operate the Proposed Scheme (in absolute terms and as a percentage of the overall area farmed). The scale of effect is based on the proportion of land required. The effects of severance are judged on the ease and availability of access to severed land once construction is completed and the impact on farm infrastructure refers mainly to the loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and

enterprises. Full details of the nature and scale of effects are set out in Volume 5: Appendix AG-001-021.

Table 12: Summary of permanent effects on holdings from construction

| Holding reference/name | Land required | Severance | Infrastructure | Scale of effect |
|---|---|---|---|---|
| CFA21/1<br>Brook Farm | 8.0ha – 7%<br>Low | Negligible | Negligible | Moderate adverse |
| CFA21/2<br>South View Farm | 2.2ha – 32%<br>High | Negligible | Negligible | Major/Moderate adverse |
| CFA21/3<br>Wiggins Hill Farm | 8.8ha – 3%<br>Negligible | Negligible | Negligible | Negligible |
| CFA21/4<br>Cranebrook | 0.7ha – 4%<br>Negligible | Negligible | Negligible | Negligible |
| CFA21/5<br>Draytonlane End Farm | 12.5ha – 65%<br>High | Negligible | High | Moderate adverse |
| CFA21/6<br>Brook Farms | 8.0ha – 22%<br>High | Medium | High | Major/Moderate adverse |
| CFA21/8<br>Canwell Park | 15.3ha – 3%<br>Negligible | Medium | Low | Moderate adverse |
| CFA21/9<br>Rookery Farm | 4.7ha – 1%<br>Negligible | Negligible | Negligible | Negligible |
| CFA21/10*<br>Home Farm | 1.8ha – 4%<br>Negligible | Negligible | Negligible | Negligible |
| CFA21/11<br>Buck's Head Farm | 29.9ha – 29%<br>High | Medium | Negligible | Major/Moderate adverse |
| CFA21/12*<br>Streetway Farm | 20.0ha – 11%<br>Medium | High | High | Major adverse |
| CFA21/13<br>Packington Moor | 9.8ha – 4%<br>Negligible | Medium | Negligible | Major/Moderate adverse |
| CFA21/14<br>Horsley Brook Farm | 12.6ha – 5%<br>Low | Medium | High | Major adverse |
| CFA21/15<br>Freeford Manor | 25.4ha – 39%<br>High | Negligible | High | Major adverse |
| CFA21/17*<br>Oak Dairy Farm | 19.9ha – 5%<br>Negligible | Medium | Negligible | Major/Moderate adverse |
| CFA21/18<br>Shirrall Hall Farm | 9.2ha – 38%<br>High | Medium | Low | Major/Moderate adverse |
| CFA21/19<br>Hudson's Equestrian Unit | 3.7ha – 16%<br>Medium | High | Negligible | Major/Moderate adverse |
| CFA21/20*<br>Oak Tree Farm | 0.1ha – 0%<br>Negligible | Negligible | Negligible | Negligible |
| CFA21/21*<br>New House Farm | 0.0ha – 0%<br>Negligible | Negligible | Negligible | Minor adverse |
| CFA21/22*<br>Holt Farm | 0.0ha – 0%<br>Negligible | Negligible | Negligible | Minor adverse |

| Holding reference/name | Land required | Severance | Infrastructure | Scale of effect |
|---|---|---|---|---|
| CFA21/23*<br>Bourne Brook Farm | 0.0ha – 0%<br>Negligible | Negligible | Negligible | Negligible |
| CFA21/24*<br>Brockhurst Stables | 0.0ha – 0%<br>Negligible | Negligible | Negligible | Minor adverse |
| CFA21/25*<br>Land east of Brockhurst Lane | 0.0ha – 0%<br>Negligible | Negligible | Negligible | Negligible |

* No farm impact assessment interview conducted; data estimated.

3.4.27 A total of 13 holdings have been identified that will experience major or moderate permanent adverse effects, which are significant. Of these, 10 will be likely to remain as agricultural or rural businesses. Three holdings will cease to be able to operate, by being rendered non-viable as agricultural or rural businesses: Cranebrook, CFA21/4; Oak Dairy Farm, CFA21/17 and Hudson's Equestrian Unit, CFA21/19. Equestrian activities are unlikely to be viable in their current form at both Drayton Lane End and Horsley Brook farms (CFA21/5 and 14). Buildings and farm infrastructure will be demolished at Cranebrook, CFA21/4; Draytonlane End Farm, CFA21/5; Buck's Head Farm, CFA21/11; Packington Moor CFA21/13 and Horsley Brook Farm, CFA21/14. These buildings include residential properties at Cranebrook, Bucks Head Farm and Packington Moor Farm. Limited access to severed land is an issue at Bucks Head Farm (CFA21/11). The effects on the users of certain diversified commercial enterprises, including wedding venue at Packington Moor, are considered in Section 5, Community.

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

### Cumulative effects

3.4.29 No significant cumulative effects on agriculture, forestry and soils have been identified for the construction of the Proposed Scheme.

## Other mitigation measures

3.4.30 Other mitigation measures include access provisions for farms, including Brook Farm (CFA21/6), Rookery Farm (CFA21/9), Packington Moor Farm (CFA21/13), Oak Dairy Farm (CFA21/17), replacement of flight ponds at Brook Farm (CFA21/4) and drainage works at Freeford Manor (CFA21/15).

## Summary of likely residual significant effects

3.4.31 Once the construction process is complete and land required temporarily has been restored, the residual permanent loss of agricultural land will be 165.6ha, of which 133.8ha (i.e. high impact magnitude) is BMV (i.e. low sensitivity in this CFA). This is assessed as a moderate adverse residual effect which is significant.

3.4.32 A total of 13 holdings have been identified that will experience major or moderate permanent adverse effects, which are significant. Of these, 10 will be likely to remain as agricultural or rural businesses and the use of compensation payments to purchase

replacement land or farm buildings could reduce the effects to not significant. It is considered that three holdings will cease to be able to operate, by being rendered non-viable as agricultural or rural businesses (Cranebrook, CFA21/4; Oak Dairy Farm, CFA21/17 and Hudson's Equestrian Unit, CFA21/19). Equestrian activities are unlikely to be viable in their current form at both Drayton Lane End and Horsley Brook farms (CFA21/5 and 14). Residential demolition will occur at three holdings and relocation will be required: Cranebrook (CFA21/4) Buck's Head Farm (CFA21/11) and Packington Moor Farm (CFA21/13).

## 3.5 Effects arising from operation

### Avoidance and mitigation measures

3.5.1 No measures are required to mitigate operational effects of the Proposed Scheme on agriculture, forestry and soils.

### Assessment of impacts and effects

3.5.2 Potential impacts arising from the operation of the Proposed Scheme will include:

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

3.5.3 The potential for significant effects on sensitive livestock receptors from noise has been assessed. No likely significant effects have been identified.

3.5.4 The propensity of linear transport infrastructure to harbour and spread noxious weeds is not only a consequence of the management of the highway and railway land, but also of the readiness of weed spread onto such land from adjoining land. The presence of noxious weeds, ragwort in particular, will be controlled through the adoption of an appropriate management regime which identifies and remedies areas of weed growth which might threaten adjoining agricultural interests.

### Summary of likely residual significant effects

3.5.5 No residual significant effects on agriculture, forestry and soils have been identified for the operation of the Proposed Scheme.

# 4 Air quality

## 4.1 Introduction

4.1.1 This section of the report provides an assessment of the impacts and likely significant effects on air quality arising from the construction and operation of the Proposed Scheme, covering nitrogen dioxide ($NO_2$), fine particulate matter (PM10 and PM2.5)[15] and dust.

4.1.2 With regard to air quality, the main issues are anticipated to result from emissions of dust from the demolition of buildings, the construction of new structures and earthworks and possible transfer of dust and mud on to public highways from vehicles travelling to and from construction areas. In addition, there may be changes in concentrations of $NO_2$ and particulate matter due to changes in road traffic during the construction and operation of the Proposed Scheme.

4.1.3 Detailed reports on the air quality data and assessments for the Drayton Bassett, Hints and Weeford area, as well as relevant maps are contained within Volume 5. These include:

- Appendix AQ-001-021;
- Volume 5: Map Book – Air quality, Map AQ-01-021; and
- Volume 5: Map Book – Air quality, Map AQ-02-021.

4.1.4 Maps showing the location of key environmental features can be found in Volume 2: CFA21 Map Book, Map series CT-10.

## 4.2 Scope, assumptions and limitations

4.2.1 The assessment scope, key assumptions and limitations for the air quality assessment are set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1), the SMR Addendum (Volume 5: Appendix CT-001-000/2) and appendices presented in Volume 5: Appendix AQ-001-021.

4.2.2 The study area for the air quality assessment has been determined on the basis of where impacts on air quality might occur from construction activities, from changes in the nature of traffic during construction and operation or where road alignments have changed.

4.2.3 The assessment of impacts arising from construction dust emissions has been undertaken using the methodology based on that produced by the Institute of Air Quality Management (IAQM). It is important to note that this methodology provides a means of assessing the scale and significance of effects that is partly dependent on the approximate number of receptors within close proximity to the dust-generating activities. In doing so, it assigns a lower scale of effect to cases where the number of properties is small, e.g. fewer than 10 properties within 20m of dust-generating activities. Thus, a single property very close to a construction site cannot experience a

[15] PM2.5 and PM10 describe two size fractions of airborne particles that can be inhaled and therefore are of concern for human health. The designations refer to particles of size less than 2.5 and 10 micrometres in diameter.

'significant effect' as defined by this methodology. The assessment presented here reaches a conclusion that incorporates this concept of significance being proportional to the number of people affected. However, in cases where less than 10 properties are within 20m of the construction activity, it will still be the case that mitigation in accordance with the CoCP will be applied.

4.2.4 The assessment of construction traffic impacts has used traffic data that is based on the highest predicted monthly flows throughout the construction period (2017-2026). However, the assessment assumes 2017 vehicle emission rates and 2017 background pollutant concentrations. The reason for this is because both pollutant emissions from exhausts and background pollutant concentrations are expected to reduce year by year as a result of vehicle emission controls, and so the year 2017 represents the worst case for the assessment. Furthermore, it has been assumed that the changes in construction traffic would occur for the whole year. In many cases, this represents a pessimistic assumption as the duration of the proposed construction works may be much shorter.

## 4.3 Environmental baseline

### Existing baseline

4.3.1 The environmental baseline reported in this section represents the environmental conditions identified within the study area. The main source of existing air pollution in the Drayton Bassett, Hints and Weeford area is traffic on the major roads, which include the A5, the A38, the A453 and the M6 Toll. The area is predominantly rural with a few small villages, including Drayton Bassett, Hints and Weeford.

4.3.2 Estimates of concentrations of $NO_2$, PM10 and PM2.5 have been obtained from UK-wide modelled background maps for 2012, published by the Department for Environment, Food and Rural Affairs (Defra)[16] in 2010. These data provide estimates of background concentrations of $NO_2$, PM10 and PM2.5 for 1km grid squares across the UK.

4.3.3 The Drayton Bassett, Hints and Weeford area lies within the West Midlands region, within the boundaries of the administrative area of Staffordshire County Council (SDC) and the local authority area of Lichfield District Council (LDC).

4.3.4 There are no continuous air quality monitoring sites within the Drayton Bassett, Hints and Weeford area.

4.3.5 Annual mean $NO_2$ concentrations are measured by LDC using passive diffusion tubes at 22 locations. Five diffusion tube monitoring sites are located within the Drayton Bassett, Hints and Weeford area, all roadside to the A38. Four sites are near Canwell, approximately 2.2km west of the centre line of the Proposed Scheme, and one site is located close to Swinfen Hall to the south of Lichfield, approximately 1.8km west of the centre line of the Proposed Scheme. Further details of these monitoring sites and the five-year trends in concentrations are available in Volume 5: Appendix AQ-001-021.

[16] Defra; 2010 Based Background Maps for NOx, $NO_2$, PM10 and PM2.5; http://laqm.defra.gov.uk/maps/maps2010.html; Accessed 11 November 2013.

4.3.6 While the diffusion tube sites can be used to indicate trends in concentrations, they are not generally representative of the predominantly rural area through which the Proposed Scheme would pass. However, within the Drayton Bassett, Hints and Weeford area, the diffusion tubes adjacent the A38 would be representative of concentrations in the vicinity of where the Proposed Scheme passes the junction of the A38 and the A453 and junction of the A453 and the A5 near Hints. Data for the sites adjacent to the A38 for the period 2008 to 2012 indicate than concentrations were above the relevant air quality standards at roadside locations on the A38 where the M6 Toll is parallel to the A38, but below the relevant air quality standards at roadside sites where the A38 is the only major road source. On this basis, the Defra background concentrations maps have been used to characterise the baseline air quality for the Drayton Bassett, Hints and Weeford area. These maps indicate the average background pollutant concentrations across the Drayton Bassett, Hints and Weeford area are less than the relevant air quality standards.

4.3.7 There are no AQMA within the Drayton Bassett, Hints and Weeford area.

4.3.8 Human receptors that could potentially be affected by changes in air quality as a result of the Proposed Scheme have been identified. Air quality at these receptors could potentially be affected, due to their proximity to construction activities, to roads with vehicle flows that may change or to roads that will be subject to realignment during the construction or operational phases of the Proposed Scheme. These locations are residential properties at Drayton Lane, Drayton Bassett; at Draytonlane End Farm, the A453 Sutton Road, Tamworth; on Watling Street (known locally as Rock Hill) near the A5/Watling Street, Weeford; on Flats Lane, Lichfield; at Packington Moor Farm on Jerry's Lane, Lichfield; at Horsley Brook Farm, off the A51 Tamworth Road and on the A51Tamworth Road, Lichfield.

4.3.9 There are no ecological receptors with statutory designations within the Drayton Bassett, Hints and Weeford area. There is one non-statutory designated site within the Drayton Bassett, Hints and Weeford area that could potentially be affected by changes in air quality as a result of the Proposed Scheme. This site is Rookery Site of Biological Importance (SBI). This site is located south of Brockhurst Lane (locally known as Rookery Lane). Further details of this site are provided under the Ecology topic, Section 7.

## Future baseline

4.3.10 Volume 5: Appendix CT-004-000 and Volume 5: Map Book – Cross Topic Appendix 1: Committed consents and development allocations, Maps CT-13-059, CT-13-060 and CT-13-061a identify developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. In this area, there is one 'committed development' that is considered to introduce new receptors requiring air quality assessment. This committed development is at Horsley Brook Farm, off the A51 Tamworth Road.

4.3.11 The data used for the air quality assessment take account of predicted changes in traffic, which are derived from a combination of national traffic growth factors and consideration of major locally consented schemes, as described in Section 12.3, Traffic and transport.

4.3.12 The potential cumulative impact from committed developments on air quality acting in conjunction with the effects from the construction and operation of the Proposed Scheme have been considered as part of this assessment. This has been achieved by including changes in traffic predicted as a result of the committed developments within the traffic data used for the air quality assessments for construction and operation, in which the future air quality baselines are defined as the 'without Proposed Scheme scenarios' at each stage.

#### *Construction (2017)*

4.3.13 Future background pollutant concentrations have been sourced from Defra background maps for 2017, which predict NO2 and PM10 levels in 2017 to be lower than in the 2012 baseline.

#### *Operation (2026)*

4.3.14 Future background pollutant concentrations have been sourced from Defra background maps for 2026, which predict NO2 and PM10 levels in 2026 to be lower than in the 2012 baseline.

## 4.4 Effects arising during construction

### Avoidance and mitigation measures

4.4.1 Emissions to the atmosphere will be controlled and managed during construction through the route-wide implementation of the draft CoCP, where appropriate. The draft CoCP includes a range of mitigation measures that are accepted by the IAQM as being suitable to reduce impacts to as low a level as reasonably practicable. It also makes provision for the preparation of Local Environmental Management Plans (LEMP) which will set out how the project will adapt and deliver the required environmental and community protection measures within each area through the implementation of specific measures required to control dust and other emissions from activities in the area.

4.4.2 The assessment has assumed that the general measures detailed in Section 7 of the draft CoCP (Volume 5: Appendix CT-003-000) will be implemented. These 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 where reasonably practicable, also taking into account the prevailing wind direction relative to sensitive receptors;
- using enclosures to contain dust emitted from construction activities; and

- undertaking soil spreading, seeding and planting of completed earthworks as soon as reasonably practicable following completion of earthworks.

## Assessment of impacts and effects

### *Temporary effects*

4.4.3 Impacts from the construction of the Proposed Scheme could arise from dust-generating activities and emissions from construction traffic. As such, the assessment of construction impacts has been undertaken for human receptors sensitive to dust and exposure to $NO_2$ and PM10, as well as ecological receptors sensitive to dust.

4.4.4 An assessment of construction traffic emissions has been undertaken for two scenarios in the construction period: a without the Proposed Scheme scenario and a with the Proposed Scheme scenario.

4.4.5 In the Drayton Bassett, Hints and Weeford area, dust-generating activities will comprise demolition and construction of new structures and earthworks, as well as possible transfer of dust and mud deposited onto public highways from vehicles travelling to and from construction compounds.

4.4.6 In the Drayton Bassett, Hints and Weeford area, dust-generating activities will comprise demolition of buildings around the junction of Drayton Lane and the A453 Sutton Road; at Bangley Lane (known locally as Waggoner's Lane); at the A5 and Watling Street; around the junction of Flats Lane and Knox's Grave Lane; at Packington Moor and at A51 Tamworth Road; construction of new structures; earthworks, including the movement of materials along the haul road along the line of the Proposed Scheme; as well as possible transfer of dust and mud deposited onto public highways from vehicles travelling to and from construction compounds.

4.4.7 A construction dust assessment was undertaken for sensitive receptors at seven locations where residential properties were present and one location where an ecological receptor was present, due to their close proximity to the dust-generating activities associated with the Proposed Scheme. The residential locations are: on Drayton Lane, Drayton Bassett; at Draytonlane End Farm, the A453 Sutton Road, Tamworth; on Watling Street near the A5, Weeford; on Flats Lane, Lichfield; at Packington Moor Farm on Jerry's Lane, Lichfield; at Horsley Brook Farm, off the A51 Tamworth Road and on the A51Tamworth Road, Lichfield. The ecological receptor is Rookery SBI.

4.4.8 Given the application of the mitigation measures contained within the draft CoCP, the construction dust assessment determined that for the locations where residential properties are present, the magnitude of effect will be slight adverse around Draytonlane End Farm, Tamworth; on Watling Street near the A5, Weeford; at Packington Moor Farm on Jerry's Lane, Lichfield; and along A51 Tamworth Road, Lichfield, due to the presence of dust-generating construction activities within 20m. The magnitude of effect will be negligible around Drayton Lane, Drayton Bassett; around Flats Lane, Lichfield; and at Horsley Brook Farm, off the A51 Tamworth Road. The magnitude of effect would be negligible at Rookery SBI.

4.4.9 Overall, the construction dust assessment determined that the air quality effects will not be significant. The basis for this conclusion can be found in Volume 5: Appendix AQ-001-021.

4.4.10 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, temporary road realignments and changes to traffic patterns arising from temporary road diversions. Screening was undertaken to identify locations requiring assessment.

4.4.11 Four locations within the Drayton Bassett, Hints and Weeford area meet the criteria for more detailed assessment of change in traffic emissions during the construction phase. There is a temporary road realignment of the A453 Sutton Road, Tamworth, which required assessment at receptors around this road. At Watling Street near the A5, Weeford; the A5 between the junction with the A38 and M6 Toll junction T5 and the A38 between A5 and A5148, the increase in construction traffic was sufficient to require assessment at receptors around these roads. This assessment found that the magnitude of effect will be negligible at all receptors assessed for NO2 and PM10.

4.4.12 Therefore, the effect on air quality due to construction traffic will not be significant. The basis for this conclusion is presented in full in Volume 5: Appendix AQ-001-021.

#### *Permanent effects*

4.4.13 There are no permanent effects anticipated to arise during construction of the Proposed Scheme.

#### *Cumulative effects*

4.4.14 There are no cumulative effects anticipated to arise during construction of the Proposed Scheme.

### Other mitigation measures

4.4.15 No other mitigation measures during construction are proposed in relation to air quality in this area.

### Summary of likely residual significant effects

4.4.16 There are no residual significant effects.

## 4.5 Effects arising from operation

### Avoidance and mitigation measures

4.5.1 No mitigation measures are proposed during operation in relation to air quality in this area.

### Assessment of impacts and effects

4.5.2 There are no direct atmospheric emissions from the operation of trains that will cause an impact on air quality; these have therefore not been assessed. Indirect emissions from sources such as rail wear and brakes have been assumed to be negligible.

4.5.3 The assessment of operational traffic emissions has been undertaken for two scenarios in the operation year 2026: a without the Proposed Scheme scenario and a with the Proposed Scheme scenario.

4.5.4 Traffic data for the Drayton Bassett, Hints and Weeford area have been screened to identify roads that required further assessment and to confirm the likely effect of the change in emissions from vehicles using those roads in 2026.

4.5.5 One location within the Drayton Bassett, Hints and Weeford area met the criteria for detailed assessment for traffic emissions following completion of the Proposed Scheme. This location was Flats Lane, Lichfield, due to permanent realignment of Flats Lane. The assessment at receptors around this road found that the magnitude of impact will be negligible at all receptors assessed for NO2 and PM10.

4.5.6 Therefore, the effect on air quality due to traffic following completion of the Proposed Scheme will not be significant. The basis for this conclusion is presented in full in Volume 5: Appendix AQ-001-021.

### *Cumulative effects*

4.5.7 There are no cumulative effects anticipated to arise during operation of the Proposed Scheme.

## Other mitigation measures

4.5.8 No significant residual effects are anticipated for receptors as a consequence of changes to air quality in this area during operation of the Proposed Scheme.

## Summary of likely residual significant effects

4.5.9 No residual significant effects are anticipated for receptors as a consequence of operation of the Proposed Scheme.

# 5 Community

## 5.1 Introduction

5.1.1 This section reports the impacts and likely significant effects on local communities resulting from the construction and operation of the Proposed Scheme.

5.1.2 Key issues concerning the community assessment for this study area comprise:

- the demolition of properties along the line of the route, particularly at Flats Lane and Knox's Grave Lane near Packington Moor Farm where the route of the Proposed Scheme cuts through the centre of a small community;
- the impacts on amenity for people living close to the construction works for the Proposed Scheme or on construction traffic routes;
- the impacts on users of the Heart of England Way, which is crossed by the Proposed Scheme at a number of locations within the Drayton Bassett, Hints and Weeford area; and
- potential disruption to local journeys and day-to-day access to facilities in the area, due to a combination of construction works and the effects of additional, construction traffic generated by the Proposed Scheme.

5.1.3 Further details of the community assessments and write-ups of recreational public rights of way (PRoW) surveys undertaken within the area are contained in Volume 5: Appendix CM-001-021. Community assessment maps are provided in Volume 5: Map Book – Community, Maps CM-01-117 to CM-01-119a.

5.1.4 The assessment draws on information gathered from a combination of desk top studies and site surveys and through engagement with local organisations, including Staffordshire County Council and Packington Moor Farm.

## 5.2 Scope, assumptions and limitations

5.2.1 The assessment scope, key assumptions and limitations for the community assessment are set out in Volume 1, the SMR (see Volume 5: Appendix CT-000/1, and the SMR Addendum (see Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

5.2.2 The construction and operation of the Proposed Scheme requires access rights over land at a number of locations within the area, both temporarily and permanently. In these instances, it is assumed that no construction works will be required and that there will be no loss of land from any residential property or community resource as a result. Where the Proposed Scheme requires works along public highways, it is also assumed that no loss of land will be required from adjacent residential properties unless specifically identified in this section of the report.

5.2.3 The Proposed Scheme also requires the diversion of overhead power lines in the Drayton Lane area. As a consequence, sections of the grid, including in the vicinity of Shirrall Hall Farm at Shirrall Drive, Holt Farm at Bangley Lane and Brockhurst Park Farm at Brockhurst Lane will require tensioning and reinforcement works to cables

and pylon towers. A corridor of land, approximately 100m wide, beneath the power lines has been identified as being required for these works. The limits of this corridor encompass a number of residential properties, however in these instances it is assumed that there will be no requirement to use any of the domestic garden curtilages.

5.2.4 The A51 Tamworth Road is taken to represent the northern boundary of the Drayton Bassett, Hints and Weeford area. The effects on community resources on the north side of the A51 are therefore addressed in the report for the neighbouring Whittington to Handsacre area (CFA22).

## 5.3 Environmental baseline

### Existing baseline

5.3.1 Baseline data on community resources were collected up to 1km from the centre line of the Proposed Scheme and, additionally, up to 250m from the boundary of land required for construction.

5.3.2 The study area includes the area of land required both temporarily and permanently for construction and operation of the Proposed Scheme, together with a wider corridor within which receptors or resources could potentially be affected by a combination of significant residual effects, such as noise, vibration, construction dust, poor air quality and visual intrusion. In addition, the study area has regard to the proposed routeing of construction traffic and takes account of the catchment areas for community facilities that could be affected where crossed by the Proposed Scheme. Overall, the study area is taken as the area of land which encompasses the likely significant effects of the Proposed Scheme.

5.3.3 The study area is predominantly rural, with the villages of Hints and Weeford and the small hamlet at Flats Lane/Knox's Grave Lane, near Packington Moor Farm being the only settlements close to the route of the Proposed Scheme. Drayton Bassett, in the south of the area, is more than 1.5km away from the Proposed Scheme and is mostly outside of the study area.

#### *Drayton Bassett*

5.3.4 Drayton Bassett lies in the south of the study area. The village has a modest range of facilities including a primary school, church, recreation ground and community halls. Whilst the centre of the village is outside the area of land required for the construction and operation of the Proposed Scheme and beyond the study area for amenity effects, there are a number of scattered rural properties along the length of Drayton Lane to the west of the village, as well as at Shirrall Drive and on parts of the A453 Sutton Road, which are taken to form part of the Drayton Bassett community. The route of the Proposed Scheme crosses Drayton Lane in the vicinity of its junction with Shirrall Drive, so that some properties within this area will fall within or close to the land required for the construction and operation of the Proposed Scheme.

5.3.5 The catchment area for the Manor Primary School at Drayton Bassett extends west of the village to include properties along the entire length of Drayton Lane, together with those along the A453 Sutton Road, Shirrall Drive and Bangley Lane (known locally as Waggoner's Lane). The Proposed Scheme crosses Drayton Lane, which is a

key route to the school from these properties. Residents of Drayton Bassett and the surrounding area are also within the catchment of secondary schools and GP surgeries at Tamworth.

5.3.6 There is a children's day care nursery located approximately 1km to the west of Drayton Bassett at Oak Farm and a small campsite at the nearby Oak Tree Farm. Both of these facilities lie outside the boundary of the land required for the construction and operation of the Proposed Scheme.

5.3.7 The Heart of England Way runs along Drayton Lane before crossing the A453 Sutton Road and heading north towards Hints. The Heart of England Way is a long-distance walking route which runs from the Cotswolds in Gloucestershire in the south to Cannock Chase in Staffordshire in the north. It also forms part of a European network of long-distance paths established by the European Ramblers Association (route number E2) which runs for over 4,800km from Stranraer in Scotland, through England, the Netherlands and Belgium, ending in the south of France. The Proposed Scheme crosses Drayton Lane and the Heart of England Way/European E2 walking route just east of the junction with the A453 Sutton Road.

### *Hints*

5.3.8 The small village of Hints lies approximately 300m to the north and east of the route of the Proposed Scheme in the centre of the study area. The main part of the village, which has a church and a village hall but no other community facilities, is entirely outside of the area of land required for the construction and operation of the Proposed Scheme. The route does however pass between the village centre and a number of outlying properties to the south in the vicinity of White Owl Farm at Brockhurst Lane (also known locally as Rookery Lane). There are also some rural properties to the south of the village along Bangley Lane, which are taken to form part of Hints. Bangley Lane is crossed by the route of the Proposed Scheme and the land required for the construction and operation of the Proposed Scheme encompasses some residential properties in this area.

5.3.9 Hints village and properties at Brockhurst Lane lie within the catchment area for both the Whittington Primary School and the Greysbrooke Primary School at Shenstone, as well as the catchment for secondary schools at Lichfield. The nearest GP surgeries are at Tamworth, Shenstone and the branch surgery at Whittington. Properties at Bangley Lane fall within the catchment for the Manor Primary School at Drayton Bassett and the Rawlett School at Tamworth (secondary school).

5.3.10 The village of Hints has no public open space, other than the church yard associated with St. Bartholomew's Church. There is a well-established network of PRoW around the village that is likely to be valued by the community as local walking routes and which provides access to the surrounding countryside. Some of these routes are crossed by the Proposed Scheme and reference should be made to Section 12 of this report, Traffic and transport, for the assessment of impacts and effects on these PRoW. The Heart of England Way runs along a section of both Bangley Lane and Brockhurst Lane to the south of Hints and is partly within the area of land required for the construction and operation of the Proposed Scheme.

### *Weeford*

5.3.11 The village of Weeford is situated in the centre of the study area and approximately 1.5km north-west of Hints. The main part of the village lies to the west of the route of the Proposed Scheme and is outside of the study area. The route of the Proposed Scheme crosses Watling Street east of Weeford village centre, where a number of residential and other properties lie close to or partly within the area of land required for the construction and operation of the Proposed Scheme. These properties are regarded as being part of the Weeford community and have been included within the study area for the assessment.

5.3.12 The centre of Weeford has a few community facilities, notably a village hall, a church and a restaurant. Like Hints, the village falls within the catchment for primary schools at Whittington and Shenstone and for secondary schools at Lichfield. The nearest GP surgeries are at Shenstone and the branch surgery at Whittington. Flats Lane, which is the principal route between Weeford and Whittington, is crossed by the route of the Proposed Scheme near Packington Moor Farm.

5.3.13 Weeford has no public open space, with the exception of the churchyard and graveyard for St. Mary's Church. These are situated within the centre of the village, beyond the study area for the Proposed Scheme. The Heart of England Way passes through Weeford and falls within the area of land required for the construction and operation of the Proposed Scheme at Watling Street at the entrance to Bourne Lodge/Bourne Cottage and at Buck's Head Farm. As with Hints, there are PRoW to the south and east of Weeford which are likely to be valued by the local community to provide access to the surrounding countryside. Reference should be made to the Section 12, Traffic and transport, of this report for further details on how these may be impacted by the Proposed Scheme. There is also a riding stable located at Weeford, which makes use of the local bridleway network in the area for its hacking and trekking activities.

### *Flats Lane to the A51 Tamworth Road*

5.3.14 There is a small residential hamlet centred on the junction of Knox's Grave Lane and Flats Lane, with a scattering of properties along Flats Lane to the south. The route for the Proposed Scheme crosses directly through the centre of this small hamlet and some residential properties lie directly within or adjacent to the area of land required for the construction and operation of the Proposed Scheme.

5.3.15 There are no community infrastructure facilities in this area, other than those at Packington Moor Farm (see below). This community falls within the catchment area for the primary school and GP branch surgery at Whittington and the King Edward VI School (secondary) at Lichfield. The Proposed Scheme crosses the routes used to access facilities at Whittington.

5.3.16 Packington Moor Farm lies to the north of the hamlet, and is also partly within the area of land required for construction and operation of the Proposed Scheme. The farm has a popular café and farm shop and some of its buildings are used for wedding ceremonies and receptions. There is also a small campsite belonging to the farm, which is located to the north-east of the farm and outside of the construction boundary for the Proposed Scheme.

5.3.17 Further north, there are a number of residential properties and farmsteads situated to the west of the A51 Tamworth Road together with the Whittington Arms public house. These properties are mostly just beyond the area of land required for the construction and operation of the Proposed Scheme, although the route crosses a number of the private tracks/roads which currently provide access from the A51 Tamworth Road. There are no public open spaces in this area, but the Heart of England Way passes to the west of the A51 and will be crossed by the Proposed Scheme just north of Packington Moor Farm and close to Horsley Brook Farm.

### Future baseline

#### *Construction (2017)*

5.3.18 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2017. Within the scope of this topic assessment, very little change is anticipated to the baseline conditions for this area. At Horsley Brook Farm, planning permission has been granted for the conversion of buildings to form two additional dwelling units and staff accommodation and the assessment assumes that these will be completed and occupied by 2017.

#### *Operation (2026)*

5.3.19 The review of future baseline conditions has not identified any additional committed developments within the study area, which will be completed by the year of operation.

## 5.4 Effects arising during construction

### Avoidance and mitigation measures

5.4.1 The following measures have been incorporated into the scheme design as part of the design development process to avoid or reduce the environmental impacts during construction:

- designing the profile of earthworks to reduce the amount of land that will be required from residential properties close to the route, including land that will be required temporarily during construction;
- routing construction traffic away from the centre of Drayton Bassett, Hints and Weeford villages;
- siting the main construction compounds outside of the Drayton Bassett, Hints and Weeford area;
- making provision within the land required for construction of the Proposed Scheme for the temporary re-routing of traffic around worksites to limit disruption to traffic during the works, including for the A453 Sutton Road to the west of Drayton Bassett and for Watling Street and the A5 at Weeford and for the A51 Tamworth Road;
- provision of new overbridges and the permanent re-routing of PRoW where necessary to avoid the permanent severance of key recreational routes;
- designing the Proposed Scheme in such a way as to allow for the phasing of the works to maintain recreational PRoW during the construction period;

- designing utilities diversions to avoid impacting on residential properties as far as practicable; and
- the provision of solid hoardings along the construction site boundaries to reduce noise impacts on nearby properties, including at Draytonlane End Farm to the west of Drayton Bassett, Bangley Lane, near Hints, Watling Street at Weeford, Packington Moor Farm at Jerrys Lane, and Freeford Home Farm and the Whittington Arms to the west of the A51 Tamworth Road.

5.4.2 The draft CoCP includes a range of provisions that will help mitigate community effects associated with construction within this area, including the following (see Volume 5: Appendix C-003-000):

- appointment of community relations personnel;
- community helpline to handle enquires from the public;
- sensitive layout of construction sites to reduce nuisance;
- where reasonably practical, maintenance of PRoW for pedestrians, cyclists and equestrians around the perimeter of construction sites and across entry and exit points;
- monitoring and management of flood risk and extreme weather events which may affect community resources during construction;
- specific measures in relation to air quality and noise will also serve to reduce impacts for the neighbouring communities including discretionary noise insulation for sensitive community resources and, in special circumstances, temporary rehousing; and
- where practicable, the avoidance of large goods vehicles operating adjacent to schools during drop off and pick up periods.

## Assessment of impacts and effects

5.4.3 Details of all assessments of community resources are included in Volume 5: Appendix CM-001-021. Each assessment form presents information that explains the rationale for determining the rating for sensitivity of the affected community resource, magnitude of impact and the assessment of significance.

### *Drayton Bassett and surrounding area*

#### Temporary effects

*Residential properties*

5.4.4 No significant effects on residents have been identified in the Drayton Bassett area. Residents at Shirrall Drive will be affected by works to realign Drayton Lane, which will impact upon journeys made on a daily basis to access the Manor Primary School at Drayton Bassett and/or to the Rawlett School at Tamworth (secondary). As the roads will remain open, except for overnight or weekend closures during the tie-in of the newly built carriageway and given that no significant delays are predicted in this area, the isolation effects on residents at Shirrall Drive, despite their high dependency on this route will be minor and not significant.

*Community facilities*

5.4.5 No significant effects on community facilities in the Drayton Bassett area have been identified.

5.4.6 The catchment area for the Manor Primary School at Drayton Bassett extends well beyond the village to include properties along Drayton Lane, the A453 Sutton Road and Bangley Lane. Whilst the Proposed Scheme crosses routes to the school from these areas, no significant disruption to journeys are anticipated and any closures required will be undertaken overnight or at weekends. On this basis, and given that the majority of the school catchment is not affected, the isolation effects on the school during the construction period will be negligible. Similarly, isolation effects on the Little Acorns Day Nursery are likely to be negligible, with access from much of its catchment being unaffected.

*Recreational PRoW*

5.4.7 The Heart of England Way runs along Drayton Lane for about 2.5km between Drayton Bassett and the A453 Sutton Road. It will be crossed by the Proposed Scheme in the vicinity of the junction with Shirrall Drive, where approximately 800m of Drayton Lane falls within the boundary of land required for construction. The Proposed Scheme makes provision to realign Drayton Lane and to maintain the route during construction. Only a brief overnight or weekend closure will be required and on this basis no temporary or permanent loss of use of this recreational route is anticipated.

5.4.8 Users of the Heart of England Way will, however, be affected by changes in amenity during the works, which are anticipated to take about 10 months to complete. Firstly, a significant increase in HGV construction traffic is predicted along this section of Drayton Lane during the construction period. Whilst people following the Heart of England Way at this location are already accustomed to walking alongside traffic, the increase in HGVs along what is presently a relatively narrow rural road without a dedicated footway will impair user enjoyment. In addition, there will be a significant effect on the visual amenities of this route due to the presence and operation of construction plant and machinery. It is also recognised that users of the route will be subject to noise impacts due to the proximity to the construction plant and machinery, but given the transitory nature of the route, these impacts are not assessed as giving rise to significant noise effects on users. Overall, the combination of increased HGVs and significant adverse visual effects will give rise to a moderate adverse amenity effect on users, which is therefore significant.

**Permanent effects**

*Residential properties*

5.4.9 No significant permanent effects on residential properties have been identified in the Drayton Bassett area.

5.4.10 Three residential properties in the Drayton Bassett area will need to be demolished during construction of the Proposed Scheme. These properties are located at the western end of Drayton Lane, namely Cranebrook, Lone Oak and Barn Cottage. The loss of three residential properties is not considered significant at a community level.

5.4.11 In addition, a further two residential properties at Draytonlane End Farm will be affected by a slight permanent loss of land along their boundaries with the A453 Sutton Road. These losses are not significant at a community level.

### *Hints and surrounding area*

#### Temporary effects

*Residential properties*

5.4.12 Residents of Brockhurst Lane, which is located to the south-west of Hints village, will be affected by works to construct the Brockhurst Lane underbridge. These works will require the closure of the road for the duration of the twelve month construction period, which will disrupt access to the centre of the village and effectively isolate the residents of approximately nine properties from the rest of the Hints community. As these properties are within the catchment area for the Whittington Primary School and the King Edward VI (secondary) at Lichfield, residents are dependent upon using this route on a daily basis for journeys to schools, as it offers the most direct route available. Closure of this road will as a consequence entail considerable diversions, typically adding about 10km to these journeys. On this basis, given the duration of the closure, the dependency on this road for access to community facilities and the lack of convenient alternative routes, the works are assessed as giving rise to a major adverse isolation effect on the residents of Brockhurst Lane, which is significant.

5.4.13 As no other significant road closures are envisaged in this area and given the potential availability of alternative routes to avoid congestion predicted at two junctions on the A38 and the A5 to the south of Lichfield, the isolation effects on residents in Hints village itself will be minor and not significant. The isolation effects on residents of the Bangley Lane area will be negligible as no congestion is predicted on routes used to access facilities at Drayton Bassett and Tamworth.

5.4.14 The assessment has not identified any groups of residential properties that will be likely to experience a combination of significant amenity effects during the construction period.

*Community facilities*

5.4.15 No significant effects on community facilities in the Hints area have been identified.

#### Permanent effects

*Residential properties*

5.4.16 No significant permanent effects on community resources in the Hints area have been identified.

5.4.17 The Proposed Scheme will require the demolition of one residential property in the Hints area at Bangley Lane, namely at White House Farm, however this is not considered significant at a community level.

5.4.18 In addition, the adjacent property at Bangley Lane, known as the Mill House, lies partly within the boundary of land required for the construction and operation of the Proposed Scheme. The slight permanent loss of land from this property is not significant at a community level.

5.4.19 The Brockhurst Lane underbridge to the south of Hints, will have limited headroom clearance, which whilst adequate for most cars, will restrict passage by higher vehicles, including some emergency service vehicles. This will impact on the access to approximately nine residential and farm properties to the south at Brockhurst Lane. Although emergency service vehicles are likely to require access on an infrequent basis, recognising the sensitivity associated with any delays caused by lengthy detours, the height restriction will give rise to a minor permanent isolation effect, which is not significant overall.

### *Weeford*

#### Temporary effects

*Residential properties*

5.4.20 The occupiers of five residential properties at Watling Street on the east side of Weeford near Buck's Head Farm will be affected by an increase in HGV traffic using Watling Street and by significant adverse visual effects associated with the construction works in this area. The works in this area will include the temporary re-routeing of Watling Street just to the north of its current alignment, the construction of the Watling Street and A5 overbridges and the earthworks for the new railway together with the formation of new balancing ponds and demolition works at Buck's Head Farm. The Watling Street overbridge works are expected to take about 18 months to complete. The combination of visual and HGV traffic effects will give rise to a major adverse amenity effect on residential occupiers, which is significant. The affected properties are:

- nos. 23-26 Watling Street; and
- The Lodge, Watling Street.

5.4.21 Weeford village falls within the catchment area for the Whittington Church of England Primary School and the King Edward VI School (secondary) at Lichfield. Children residing at Weeford are also eligible for the Greysbrooke Primary School at Shenstone. As explained in the traffic and transport section of this report (Section 12), the construction traffic that will be generated by the Proposed Scheme will result in significant congestion at the junction between the A38, the A5148 and the A5206. This will cause delays to journeys to facilities at Lichfield, including the secondary school. As none of the other alternative routes used to access community facilities on a daily basis are likely to become congested during the works, the isolation effects on the community of Weeford will be minor, which is not significant.

*Community facilities*

5.4.22 No significant effects on community facilities at Weeford village have been identified.

*Recreational PRoW*

5.4.23 The Heart of England Way is crossed by the route of the Proposed Scheme to the east of Weeford, where approximately 800m of the route falls within the boundary of land required for the construction of the Proposed Scheme. It is anticipated that the works in this area will be phased so that no closure of the route will be necessary during the 18 month construction period. Users of this route, including riders from the Weeford Stables, will however be affected by a significant change in amenity during the

construction period. A combination of significant adverse visual effects and the increase in HGV construction traffic predicted on Watling Street, which the Heart of England Way crosses, will give rise to a moderate adverse amenity effect on people using this section of the recreational route, which is significant. It is also recognised that users of the route will be subject to noise impacts during construction as a result of proximity to the works, but given the transitory nature of the route, the impacts of construction noise are not considered to give rise to a significant noise effect on users.

**Permanent effects**

*Residential properties*

5.4.24 No significant permanent effects on residential properties in the Weeford area have been identified.

5.4.25 Construction of the Proposed Scheme will require the demolition of one residential property at Buck's Head Farm, Watling Street. The loss of a single residential property is not considered significant at a community level.

5.4.26 The Proposed Scheme will also require the slight permanent loss of land along the access track to Bourne Lodge and Bourne Cottage at Watling Street to allow for the improvement of this track and its use as an access to the proposed balancing ponds to the south. The area required will not encroach into the domestic gardens of the two properties and the effects are not significant at a community level.

*Recreational PRoW*

5.4.27 At Weeford, the Proposed Scheme will require the Heart of England Way to be permanently diverted to the east of its current position at Bucks Head Farm, to enable the route to be connected with a replacement bridleway bridge over the A5. This will increase the length over which the route has to remain on the highway by about 150m. As this section of the Heart of England Way runs along Watling Street at present, the adverse effects associated with the additional diversion are assessed as minor and not significant.

## *Flats Lane to the A51 Tamworth Road*

**Temporary effects**

*Residential properties*

5.4.28 The occupiers of eight residential properties at Flats Lane will be affected temporarily by significant adverse visual effects associated with the construction works in the area and an increase in HGV construction traffic which is predicted along Flats Lane. The works in this area are likely to last for about 15 months and are assessed as giving rise to a major adverse amenity effect on the residents which is significant. The properties that will be affected are:

- nos. 10 and 11 Flats Lane (together with the annex to the rear of no. 11); and
- nos. 18-22 Flats Lane.

5.4.29 As Flats Lane will remain open during the construction works and given that no significant congestion or delays have been predicted in this area, the adverse effects

on access to community facilities at Whittington and Lichfield will be minor, which is not significant.

*Recreational PRoW*

5.4.30 The Proposed Scheme crosses the route of the Heart of England Way public bridleway just to the north of Packington Moor Farm and close to Horsley Brook Farm. It is envisaged that the works in this area will be phased so that a temporary closure will not be necessary during the construction period.

**Permanent effects**

*Residential properties*

5.4.31 The Proposed Scheme will require the demolition of 13 residential properties from the small hamlet in the vicinity of Packington Moor Farm at Flats Lane and Knox's Grave Lane. The properties that will be affected are:

- nos. 1-11 Knox's Grave Lane (odd numbers);
- no. 2 Knox's Grave Lane together with the annex at the rear of the property;
- nos. 12, 13, 16 and 17 Flats Lane; and
- Egg Cottage, Packington Moor Farm.

5.4.32 The permanent loss of these residential properties, which account for about half of the overall community of this small hamlet, will give rise to a major adverse effect which is significant.

5.4.33 The Proposed Scheme will also require the slight permanent loss of land from the boundary of 20 Flats Lane, which is not considered significant at a community level.

5.4.34 The route of the Proposed Scheme crosses the private access roads serving five residential and farmsteads to the west of the A51 Tamworth Road (including the extant planning permission for two additional dwellings at Horsley Brook Farm). The scheme design makes provision to re-route these accesses but will add between 400m and 850m to the length of some journeys from Horsley Brook Farm, the Bungalow and Ingleyhill Farm depending upon origins and destinations. As the permanent re-routing will be less direct than at present it will impact on pedestrian journeys to use facilities at Whittington Heath, including the Pre-school and play areas which are located close to the Barracks. On this basis, the re-routing of the access tracks is assessed as giving rise to a moderate adverse and permanent isolation effect on residents of the affected properties, which is significant. Access to the properties will be maintained during construction due to the phasing of the works.

*Community facilities*

5.4.35 The Proposed Scheme will require the demolition of most of the buildings at Packington Moor Farm, including buildings used for wedding ceremonies and receptions. Given the extent of demolitions and that the remaining buildings are unlikely to offer suitable alternative accommodation for these uses, the Proposed Scheme will effectively result in the complete closure of the wedding facility. In addition, whilst the shop, café, holiday accommodation and the small campsite on the eastern side of the farm are situated outside of the area of land required for the

construction and operation of the Proposed Scheme, these facilities are operated as an integral part of the diversified farm operations and it is therefore assumed that they too will be displaced as a consequence of the permanent land take and demolitions at the farm. The farm currently offers a unique and distinctive rural setting for civil weddings and the venue is popular and well-used, serving a catchment which extends beyond the local area. The busy café and farm shop attract a significant number of visitors each day, serving and selling produce grown on the farm. Overall, the permanent loss of these facilities at the farm is therefore assessed as a major adverse effect which is significant.

*Recreational PRoW*

5.4.36 The Heart of Way is crossed again by the Proposed Scheme just to the north of Packington Moor Farm in the vicinity of Horsley Brook Farm. The scheme design makes provision to divert the route of this bridleway to cross the railway via the new Horsley Brook Farm green overbridge. This will avoid any permanent severance of the route and will not have a significant effect on the function of the route. This slight re-routing is assessed in the traffic and transport section of this report (Section 12) as a minor adverse effect, which in the context of the community topic is not considered to be significant.

### Cumulative effects

5.4.37 There will be a community wide effect on the residents of the Flats Lane to A51 Tamworth Road area. All inhabitants of the small rural hamlet focused on the junction of Knox's Grave Lane and Flats Lane, situated between Weeford and Wittington, will experience a community wide effect on their quality of life and sense of community. The construction of the Proposed Scheme will result in the demolition of about half of the residential properties belonging to this small hamlet, with the remaining households isolated as a consequence and experiencing significant amenity effects during construction.

5.4.38 Additionally, Packington Moor Farm, which is situated just to the north of these properties, will also be demolished, resulting in the permanent loss or displacement of its wedding and café facilities, as well as a residential property. All of these impacts have been assessed as giving rise to major adverse and significant effects on the community of this area.

## Other mitigation measures

5.4.39 The assessment has concluded that construction of the Proposed Scheme will give rise to some significant adverse effects on community resources in the Drayton Bassett, Hints and Weeford area. No further measures are proposed to mitigate these effects.

## Summary of likely significant residual effects

5.4.40 The construction of the Proposed Scheme will give rise to a number of residual effects on community resources in the Drayton Bassett, Hints and Weeford area. The locations of resources likely to be affected are shown in Volume 2: Maps CM-01-117 to CM-01-119a.

5.4.41 The area that will be the most affected is the small community focused on the junction of Knox's Grave Lane and Flats Lane, situated between Weeford and Whittington. The construction of the Proposed Scheme will result in the demolition of about half of the residential properties belonging to this small hamlet, with the remaining households experiencing significant amenity effects during construction. Packington Moor Farm, which is situated just to the north of these properties, will also be demolished, resulting in the permanent loss or displacement of its wedding and café facilities, as well as a residential property. All of these impacts have been assessed as giving rise to major adverse and significant effects on the community of this area.

5.4.42 No significant effects on residential properties and community facilities at Drayton Bassett have been identified, although users of the Heart of England Way, which passes through the village and is crossed by the Proposed Scheme, will be affected by a significant change in amenity during construction. This has been assessed as a moderate adverse effect, which is significant.

5.4.43 In the Hints area, residents of Brockhurst Lane, which is located to the south-west of the village, will be subject to a major adverse isolation effect during the construction period caused by the temporary closure of the road at the underbridge construction site. This will necessitate considerable detours for journeys to access the main part of the Hints community, its facilities and the most direct routes to schools at Whittington and Lichfield.

5.4.44 In the Weeford area, construction works at Watling Street will give rise to a major adverse and temporary amenity effect on the residents of five properties situated close to the works.

## 5.5 Effects arising from operation

### Avoidance and mitigation measures

5.5.1 As part of the design development process for the Proposed Scheme, a number of measures have been incorporated within the proposals, to avoid or reduce effects on the amenity of community resources during operation. These include:

- the incorporation of landscape earthworks both to assimilate the Proposed Scheme into the wider landscape setting and to help reduce operational noise levels that might be experienced by residents in the vicinity of Drayton Lane, Bangley Lane, Hints and Weeford;
- the incorporation of landscaping and planting to limit the potential visual impact of the Proposed Scheme, particularly in the Hints and Weeford areas;
- aligning the route in cutting wherever practicable to limit both visual and noise impacts; and
- the provision of noise barriers, including to the south of Drayton Lane, at Bangley Lane and to the south of Hints.

5.5.2 Noise barrier locations are shown in Volume 2: CFA21 Map Book, Map series SV-05.

### Assessment of impacts and effects

5.5.3 No significant effects have been identified during operation.

### Other mitigation measures

5.5.4 Further mitigation is not required as no significant effects have been identified.

### Residual significant effects

5.5.5 No residual significant effects have been identified.

# 6 Cultural heritage

## 6.1 Introduction

6.1.1 This section of the report provides a description of the current baseline for heritage assets and reports the likely impacts and significant effects resulting from construction and operation of the Proposed Scheme. Consideration is given to the extent and heritage value (significance) of assets including archaeological and palaeo-environmental remains; historic buildings and the built environment; and historic landscapes.

6.1.2 With regard to heritage assets, the main issue is the extent to which designated and non-designated assets are affected by the Proposed Scheme. Impacts on assets as a result of the Proposed Scheme will occur largely through the physical removal and alteration of assets and changes to their setting.

6.1.3 Maps showing the location of the key environmental features can be found in Volume 2: CFA21 Map Book, Map series CT-10. Maps showing the location of all designated and non-designated heritage assets can be found in Volume 5: Map Book – Cultural heritage. Detailed reports on the cultural heritage character and surveys undertaken within the local area are contained in the Volume 5 Appendices. These include:

- Appendix CH-001-021 – Baseline report;
- Appendix CH-002-021 – Gazetteer of heritage assets;
- Appendix CH-003-021 – Impact assessment table; and
- Appendix CH-004-021 – Survey reports.

6.1.4 Throughout this section, assets within the study areas are identified with a unique reference code, DHWXXX; further detail on these assets can be found in the gazetteer in Volume 5: Appendix CH-002-021.

6.1.5 Engagement has been undertaken with the Staffordshire County Council with regard to the nature of the heritage assets within the local area.

## 6.2 Scope, assumptions and limitations

6.2.1 The assessment scope, key assumptions and limitations for the cultural heritage assessment are set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

6.2.2 The setting of all designated heritage assets up to 2km of the centre line of the Proposed Scheme has been considered. The study area within which a detailed assessment of all assets, designated and non-designated, has been carried out, is defined as the land required, temporarily or permanently, to construct the Proposed Scheme plus 500m.

6.2.3 The cultural heritage methodology includes consideration of the intra-project effects of a number of technical topic assessments, for example, landscape and visual,

ecology, and water resources and flood risk. Consequently, these interactions have been included in the assessment of impacts and effects.

6.2.4 In undertaking the assessment the following limitations were identified:

- the LiDAR[17] data examined did not encompass the full extent of the study area; and
- not all areas of survey as identified in the archaeological risk model[18] were available for survey.

6.2.5 However, non-intrusive field survey was undertaken in a number of areas to provide data regarding the nature of sub-surface archaeological assets. Information from other sources of data, including the Historic Environment Record and local archives was utilised to provide information relating to the potential archaeological assets that may be present.

## 6.3 Environmental baseline

### Existing baseline

6.3.1 In compiling this assessment, documentary baseline data was collected from a variety of sources as set out in Volume 5: Appendix CH-001-021.

6.3.2 In addition to collating this baseline data, the following surveys were undertaken:

- walkover and site reconnaissance from areas of public access or in locations where access was granted. This was undertaken to understand the character and form of heritage assets and the historic landscape; to review the setting of assets; and to identify previously unknown assets;
- desk-top review of remote sensing data including LiDAR, aerial photographs and hyperspectral data (see Volume 5: Appendix CH-004-021); and
- a programme of non-intrusive surveys including geophysical surveys (see Volume 5: Appendix CH-004-021).

#### *Designated assets*

6.3.3 The following designated heritage assets are located partially or wholly within the land required, temporarily or permanently, for the construction of the Proposed Scheme (see Volume 5: Map Book – Cultural heritage, Maps CH-01-117 to CH-01-119a):

- the Grade II listed outbuildings at Buck's Head Farmhouse (DHW057) and associated structures (not listed); and
- ancient woodland at Rookery (DHW123) and Roundhill Wood (DHW119).

[17] Light detection and ranging (LiDAR) is a high resolution remote sensing technique to capture 3D data.
[18] The archaeological risk model is an approach that enables the identification of those areas of the Proposed Scheme where archaeological assets are known or suspected and provides a mechanism for the prioritisation of the programme of survey.

6.3.4 The following designated assets are located within 2km of the centreline (see Volume 5: Map Book – Cultural heritage, Maps CH-02-111 to CH-02-112):

- two Grade II* listed buildings: Swinfen Hall (DHW192) and the Church of St. Peter in Drayton Bassett (DHW071);
- thirty-one Grade II listed buildings including concentrations in Hints (DHW360),Weeford (DHW137) and Whittington (DHW304) and numerous dispersed farms such as Horsley Brook Farm (DHW045) and Ingleyhill Farm (DHW042);
- one conservation area at Hints (DHW360), 200m east of the scheme centreline; and
- nine areas of ancient woodland: Milditch (DHW133); Rough Leasow (DHW161); Trickley Coppice (DHW156); Shirrall Coppice (DHW110); Shirrall Gorse (DHW158); Brock Hurst (DHW117); Weeford Park(DHW160); Hanging Wood (DHW164); and Hopwas Hays Wood (DHW165).

### *Non-designated assets*

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

- Watling Street (DHW138), the alignment of the Roman Road passes north of Hints, parallel with the A5;
- a prehistoric or Roman pit alignment (DHW141) lies north of the A5, east of Flats Lane;
- a prehistoric or Roman pit alignment (DHW127) lies just north of the A5;
- a Roman field system (DHW125) lies adjacent to the A5 just north of Buck's Head Farm;
- Prehistoric or Roman linear features and pits (DHW143) lie just south of Packington Moor Farm;
- Packington Moor Farm (DHW214); and
- seven lengths of important hedgerow[19]: DHW148 (Middleton Estate boundary), DHW149 (Shirrall deer park boundary), DHW150 (Shirrall and Drayton deer park boundary), DHW151 (Shirrall, Bangley and Drayton deer park boundary), DHW152 (Bangley deer park boundary), DHW153 (Weeford parish boundary) and DHW154 (Knox's Grave Lane).

6.3.6 The following identified non-designated assets of low value lie wholly or partially within the land required, temporarily or permanently, for the construction of the Proposed Scheme:

[19] Criteria 1-5 of Schedule One, Part II of the *1997 Hedgerow Regulations*.

- five buildings of local interest: Barn cottage (DHW263), Moor Cottages (215), Whittington Arms (DHW204), South Lodge (DHW205), The Lodge (DHW233);
- nine archaeological assets (DHW102, DHW104, DHW111, DHW126, DHW132, DHW134, DHW145; DHW147, DHW166); and
- the extents of three former deer parks Drayton Deer Park (DHW105); Shirrall Deer Park (DHW107) and Bangley Deer Park (DHW114).

6.3.7 All non-designated heritage assets within 500m of the land required, temporarily or permanently, for the construction of the Proposed Scheme are listed in the gazetteer in Volume 5: Appendix CH-002-021 and identified on Volume 5: Map Book – Cultural heritage, Maps CH-01-117 to CH-01-119a. There are a number of built heritage assets, the settings of which have been considered, for example:

- Packington Moor Farm (DHW214);
- Oak Farm (DHW 264);
- Draytonlane End Farm (DHW262);
- Stone House (DHW265);
- Great Bangley Farm (DHW260);
- Hints Farm (DHW259);
- The Old Rafters (DHW250);
- Bourne Cottage (DHW231);
- Bourne House (DHW234);
- The Lodge (DHW233);
- Hare Park Farm (DHW220);
- Freeford Home Farm (DHW209);
- The Whittington Arms (DHW204); and
- South Lodge (DHW205).

### *Cultural heritage overview*

6.3.8 The underlying bedrock geology of the study area is dominated by Triassic Mudstone in the south and Triassic Sandstone in the north. The superficial geology of the study area is dominated by Flandrian alluvial deposits of clay, silt, sand and gravel, running roughly east-west across the study area between Hints and Weeford along the existing Black Brook river valley, a tributary of the River Tame.

6.3.9 To the north of Black Brook, a ridge of hills rises in a north-easterly direction from Hints to Hopwas Hays Wood. These reach heights of 150m AOD. The northern part of the study area, between Weeford and Whittington, is undulating and cut by small stream valleys at around 90m AOD and with peaks around 105m AOD. The fertile neutral clay-rich soils in the study area support woodland and pasture.

6.3.10 The geology and topography of the study area, on free-draining soils, located close to a number of water sources and with gently sloping topography at the north and south, is well-suited to occupation and exploitation during the prehistoric and Romano-British periods. The central area around Hints Hills is less likely to have been occupied due to the steeply undulating topography. Alluvium is recorded along the courses of the Black-Bourne Brook and Gallows Brook and the potential of these deposits to preserve palaeo-environmental remains has been recognised. Any environmental remains may help in reconstructing past environments, thereby allowing for a more in-depth understanding of past societies.

6.3.11 There is no evidence in the landscape for occupation from the early prehistoric periods, but with significant finds of flint and pottery from west and southwest of the study area (for example during construction of the M6 Toll), there is potential for evidence to be discovered, particularly on raised and undulating ground near to the Black Brook and Gallows Brook.

6.3.12 Possible Late Bronze Age or Iron Age field systems have been recorded in the study area (DHW127, DHW141) and a number of cropmark sites (DHW101, DHW102, DHW111, DHW112, DHW142, DHW166) are likely to date to the Iron Age. These are near Draytonlane End Farm, north of Middleton, at Roundhill Wood and north of the A5. Again, for this period settlement evidence is concentrated in the vicinity of the brooks, rather than on higher ground in the centre of the study area.

6.3.13 The study area is located within the hinterland of the Roman town of Wall, which lies 3km to the west, and the Roman road of Watling Street (DHW138) traverses the northern end of the study area. A number of cropmark sites (DHW125, DHW139, DHW143, DHW146) are likely to be Romano-British in date; these are concentrated at the northern end of the study area, to the north of Hints near to Watling Street.

6.3.14 There is no evidence for early medieval settlement in the study area, in common with much of the broader region. Drayton Bassett, Hints and Weeford are all listed in the Domesday Book of 1086, indicating there may have been earlier settlements in these areas. Excavations in advance of the construction of the M6 Toll road west of the study area did not reveal any substantial evidence of Anglo-Saxon settlement, with only a small number of pottery sherds dating to this period being recovered. Excavations did suggest, however, that the Roman road Watling Street was maintained through the early medieval and even into the medieval period.

6.3.15 In the medieval period the Black Brook at Hints and Weeford marked the boundary between Royal Cannock Forest to the north and Sutton Chase to the south. Cannock Forest was established by William the Conqueror, while Sutton Chase was established in 1126 as a hunting reserve of the Earls of Warwick. The study area will most likely have been wooded during the medieval period, with medieval parks known at Drayton Bassett (Shirrall Deer Park DHW106 and Drayton Deer Park DHW105) and Hints (Bangley Deer Park DHW114). In addition, a monastic landscape survives north of Middleton in the western part of the study area. Canwell Priory was established around 1140 on land adjacent to Bangley Park.

6.3.16 Scattered areas of ridge and furrow cultivation are seen within the study area, and while these have not been definitively dated to the medieval period, they may represent the small-scale cultivation associated with dispersed settlement. Aerial

photography provides cropmark evidence of small scale field systems at Brockhurst (DHW116), Packington Moor Farm (DHW147), north and west of Hints (DHW132, DHW118), at Gallows Brook and at Trickley Coppice (DHW104, DHW103), which support this interpretation of the landscape.

6.3.17 The landscape of the study area is therefore predominantly post medieval in form and character and entirely rural, with buildings reflecting the agricultural nature of the area in this period, in the form of farmsteads e.g. Horsley Brook Farm (DHW045) and Ingleyhill Farm (DHW042) and scattered smaller agricultural buildings as well as small-scale industrial remains and the remains of some larger estates e.g. the late-medieval deer parks at Shirrall Park, Drayton Park and Bangley Park. The settlements within the study area developed significantly during this time, and the deforestation and enclosure of the landscape were undertaken. The majority of the landscape was used for agriculture, with arable fields dominating to the north and south and woodland characterising the Hints Hills.

6.3.18 There are only two areas of denser settlement in the study area, within the villages of Hints (DHW360) and Weeford (DHW137) which lie south of the A5. The conservation area at Hints (DHW360) encompasses the historic core of the village, including Hints Manor, St Bartholomew's Church, the grounds of Hints Old Hall and a former mill pond to the northwest. The village is positioned on a south facing slope, between Black Brook and Watling Street, overlooking hills fields and woodland and it has a sense of remoteness, seclusion and quietness that contributes to its character. Despite their medieval origins the villages are predominantly 19th century in character – the medieval cores of the villages do not survive.

6.3.19 Patchy woodland throughout the southern part of the area reflects a more wooded past landscape. Areas of ancient woodland identified in the vicinity of the Proposed Scheme are Rookery (DHW123) and Roundhill Wood (DHW119).

6.3.20 The post-medieval period in the study area is represented by the enclosure of land through piecemeal processes and formal enclosure acts from the 18th century. Lengths of seven important hedgerows have been identified within the extent of the Proposed Scheme.

6.3.21 The Black Brook was a focus for local manufacturing industries with forges and mills recorded along its length. The landscape south of Hints contains some evidence of former industrial buildings – none of which survives upstanding today. A forge and a mill at Hints (DHW126) which appear on early maps were demolished before 1847.

6.3.22 Also just within the boundaries of the study area are the grounds and landscaped parks of several 18th century estates. These include: the former extent of the grounds of Packington Hall (DHW049) just south of Whittington Heath; the former boundary of Hints Hall Park and its Lodge (DHW193, DHW233); and Swinfen Park (DHW192) containing the Grade II* listed former hall, now a hotel.

## Future baseline

### *Construction (2017)*

6.3.23 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2017. None of the identified developments

affect the assessment of the Proposed Scheme's likely construction impacts on heritage assets.

#### *Operation (2026)*

6.3.24 No committed developments have been identified in this local area that will materially alter the baseline conditions in 2026.

## 6.4 Effects arising during construction

### Avoidance and mitigation measures

6.4.1 The draft Code of Construction Practice (CoCP) sets out the provisions that will be adopted to control effects on cultural heritage assets. The provisions include the following (see Volume 5: Appendix CT-003-000):

- management measures that will be implemented for assets that are to be retained within the land required for the construction of the Proposed Scheme;
- the preparation of project wide principles, standards and techniques for works affecting heritage assets;
- a programme of archaeological investigation and recording to be undertaken prior to/or during construction works affecting the assets; and
- a programme of historic building investigation and recording to be undertaken prior to modification or demolition of the assets.

6.4.2 The following measures have been incorporated into the design of the Proposed Scheme to reduce impacts on assets:

- alignment avoids majority of ancient woodland, passing closely between and only affecting the edges of Rookery (DHW123) and Roundhill Wood (DHW119);
- alignment avoids the principal listed buildings at Ingleyhill Farm (DHW042) and Horsley Brook Farm (DHW045);
- landscape planting and earthwork design near the village of Hints (DHW360) reduces impact on the setting of its historic core; and
- the Lodge (DHW233) will be retained within the land required to construct the Proposed Scheme.

### Assessment of impacts and effects

#### *Temporary effects*

6.4.3 The construction works, comprising excavations and earthworks and including temporary works such as construction compounds, storage areas, and diversion of existing roads and services, have the potential to affect heritage assets during the construction period. Impacts will occur to assets both within the land required for the construction of the Proposed Scheme and assets in the wider study area due to the visibility of plant, cranes and equipment; and other construction factors.

6.4.4 The significant effects described below will occur as a result of temporary impact on the setting of designated or non-designated heritage assets in the period between approximately May 2017 and January 2023.

6.4.5 Stone House (DHW265), an asset of moderate value, will have its largely rural setting altered during construction of the main alignment and road diversion at Shirrall Drive. Construction activity for the Drayton Lane embankment will be undertaken over a period of approximately 2 years. This will constitute a high adverse impact and major adverse effect.

6.4.6 The Lodge (DHW233), an asset of low value, will be retained within the land required to construct the Proposed Scheme. Construction activity relating to the construction of the main alignment and use of the Black Brook viaduct satellite compound will considerably alter the local setting of the asset. Construction activity for the Black Brook viaduct will be undertaken over a period of approximately 1 year and the Buck's Head embankment over a period of 1.5 years. This will constitute a high adverse impact and moderate adverse effect.

6.4.7 Packington Moor Farm (DHW214), an asset of moderate value, will have its immediate and wider rural setting considerably altered during construction of the main line and demolition of farm buildings. Construction of the Swinfen cutting will take place over period of approximately 5 years. This will constitute a high adverse impact and major adverse effect.

6.4.8 Horsley Brook Farm (DHW045), an asset of moderate value, will have its rural setting altered during construction of the main cutting approximately 200m away. Construction of the Swinfen cutting will take place over period of approximately 5 years. This will constitute a medium adverse impact and moderate adverse effect.

6.4.9 Ingleyhill Farm (DHW042), an asset of moderate value, will have its rural setting altered during construction of the main cutting approximately 300m away. Construction of the Swinfen cutting will take place over period of approximately 5 years. This will constitute a medium adverse impact and moderate adverse effect.

6.4.10 Draytonlane End Farm (DHW262), an asset of low value, will have its landscape setting considerable altered during construction of the Drayton Lane cutting adjacent to the farm. Construction activity for the will take place over a period of approximately 4 years. This will constitute a high adverse impact and moderate adverse effect.

6.4.11 Hints Village (DHW360), an asset of moderate value, will have its rural setting and sense of remoteness and quietness affected during construction of the main line approximately 100m from the edge of the asset. Construction activity for the Hints cutting will take place over a period of approximately 3.5 years. This will constitute a medium adverse impact and moderate adverse effect.

## Cumulative effects

6.4.12 It is not considered that there will be any cumulative effects from temporary impacts on heritage assets within the study area.

### *Permanent effects*

6.4.13 The significant effects described below will occur as a result of physical impacts on heritage assets within the land required for the construction of the Proposed Scheme.

6.4.14 A group of buildings at Buck's Head Farm, an asset of moderate value, will be demolished to enable construction of the main line embankment and landscaping. The Grade II listed outbuildings (DHW057) will not be demolished. While the listed buildings will be retained, they will no longer be in their historic landscape setting, with the cutting for the Proposed Scheme passing adjacent to them and their legibility as farm buildings once part of a group will be diminished. This will constitute a high adverse impact and major adverse effect.

6.4.15 Barn Cottage (DHW263), an asset of low value, will be demolished for construction of the main line. This will constitute a high adverse impact resulting in a moderate adverse effect.

6.4.16 Moor Cottages (DHW215) an asset of low value, will be demolished for construction of the Proposed Scheme cutting and Flats Lane diversion. This will constitute a high adverse impact resulting in a moderate adverse effect.

6.4.17 Part of Important hedgerow DHW148 (Middleton Estate boundary), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a medium adverse impact and moderate adverse effect.

6.4.18 Part of Important hedgerow DHW152 (Bangley deer park boundary on Bangley Lane), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a medium adverse impact and moderate adverse effect.

6.4.19 Part of Important hedgerow DHW153 (Weeford parish boundary), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a medium adverse impact and moderate adverse effect.

6.4.20 Part of Important hedgerow DHW154 (Knox's Grave Lane), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a medium adverse impact and moderate adverse effect.

6.4.21 All of the identified length of Important hedgerow DHW149 (Shirrall deer park boundary), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a high adverse impact and major adverse effect.

6.4.22 All of the identified length of Important hedgerow DHW150 (Shirrall and Drayton deer park boundary), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a high adverse impact and major adverse effect.

6.4.23 All of the identified length of Important hedgerow DHW151 (Shirrall, Bangley and Drayton deer park boundary), an asset of moderate value, will be removed to enable construction of the Proposed Scheme. This will constitute a high adverse impact and major adverse effect.

6.4.24 Part of the ancient woodland at Rookery (DHW123), an asset of high value, will be removed to enable construction of the main line and associated engineering embankments. This will also affect the character of the remaining woodland where the Proposed Scheme and woodland meet. This will constitute a high adverse impact and major adverse effect.

6.4.25 Part of the ancient woodland Roundhill Wood (DHW119), an asset of high value, will be removed to enable construction of the main line and associated engineering embankments. This will also affect the character of the remaining woodland where the Proposed Scheme and woodland meet. This will constitute a high adverse impact and major adverse effect.

6.4.26 Archaeological remains of possible prehistoric date associated with the cropmarks south of Gallows Brook (DHW102), an asset of low value, will be removed during the construction of the Proposed Scheme. This will constitute a high adverse impact and moderate adverse effect.

6.4.27 Archaeological remains of probable medieval date north of Gallows Brook (DHW104), an asset of low value, will be removed during the construction of the Proposed Scheme. This will constitute a high adverse impact and moderate adverse effect.

6.4.28 Archaeological remains of possible prehistoric date associated with a field system at Hill Farm (DHW111), an asset of low value, will be removed during the construction of the Proposed Scheme. This will constitute a high adverse impact and moderate adverse effect.

6.4.29 Archaeological remains associated with a Roman field system north of the A5 (DHW125), an asset of moderate value, will be removed during the diversion of the A5. This will constitute a high adverse impact and major adverse effect.

6.4.30 Archaeological remains associated with a relict field system, probably of medieval date, north-west of Hints (DHW132), an asset of low value, will be removed during the construction of the Proposed Scheme. This will constitute a high adverse impact and moderate adverse effect.

6.4.31 Archaeological remains of possible prehistoric or Roman date associated with a pit alignment and enclosure east of Flats Lane (DHW141), an asset of moderate value, will be removed during the construction of the Proposed Scheme. This will constitute a high adverse impact and major adverse effect.

6.4.32 Archaeological remains of possible prehistoric or Roman date associated with the cropmarks south of Packington Moor (DHW143), an asset of moderate value, will be removed during the construction of the Proposed Scheme. This will constitute a medium adverse impact and moderate adverse effect.

6.4.33 Archaeological remains of possible prehistoric date associated with an enclosure at Roundhill Wood (DHW166), an asset of low value, will be removed during the construction of the Proposed Scheme. This will constitute a high adverse impact and moderate adverse effect.

6.4.34 The following paragraphs describe the significant effects that will occur as a result of permanent impacts on the setting of heritage assets.

6.4.35 Ingleyhill Farm (DHW042), two listed buildings of moderate value, will be subject to impact on its setting due to the visual presence of the constructed Proposed Scheme in cutting less than 300m away east of the farm, which will disrupt historic farmland views and some access. This will constitute a medium adverse impact and moderate adverse effect.

6.4.36 Horsley Brook Farm (DHW045), comprising four listed buildings and of moderate value, will be subject to impact on its setting due to the visual presence of the constructed Proposed Scheme adjacent to the farm – the asset will be affected by a disruption of its historic landscape setting and open views. This will constitute a medium adverse impact and moderate adverse effect.

6.4.37 Hints village (DHW360), a conservation area and of moderate value, borders the Proposed Scheme, and while screened from it by woodland and intervening topography, there will be an impact on views of the village from the north and east. The Proposed Scheme will separate the western edge of the village from its local historic landscape and create notable change in the character of the village around the brook. This will constitute a medium adverse impact and moderate adverse effect.

6.4.38 Bourne House (DHW234), an asset of moderate value, is 200m from the Black Brook viaduct and will experience permanent changes to views from the front of the property. This will constitute a medium adverse impact and moderate adverse effect.

6.4.39 Draytonlane End Farm, the A453 Sutton Road (DHW262), an asset of low value, will lie adjacent to the Proposed Scheme. The construction of the Proposed Scheme will disrupt historic access and change the landscape setting of the farm, curtailing views to the north and cutting through adjacent fields which provide the setting for the asset. This will constitute a high adverse impact and moderate adverse effect.

6.4.40 Stone House (DHW265), an asset of moderate value, will be less than 100m from the Proposed Scheme, its views to open countryside curtailed by the scheme which runs in a shallow embanked cutting, and its historic access realigned. This will constitute a medium adverse impact and moderate adverse effect.

6.4.41 Packington Moor Farm (DHW214), an asset of moderate value, will be approximately 50m from the Proposed Scheme. A group of 15 non-designated buildings within the farm complex will also be demolished to enable construction of the main line. The farmhouse will be retained but it will lose its farm complex setting and relationship to local landscape. This will constitute a high adverse impact and major adverse effect.

### *Permanent cumulative effects*

6.4.42 There are no inter-project effects on cultural heritage.

## Other mitigation measures

6.4.43 Refinements to the mitigation measures incorporated into the design of the Proposed Scheme or included in the draft CoCP will be considered during detailed design to reduce further the significant effects described above. These refinements will include the identification of:

- suitable locations for advance planting, to reduce impacts on the setting of assets; and

- locations where the physical impact on below-ground assets can be reduced through the design of earthworks.

### Summary of likely residual significant effects

6.4.44 A range of archaeological assets will be permanently lost due to the construction of the Proposed Scheme; these assets include prehistoric cropmark sites and Romano-British settlement remains. A programme of archaeological works will be prepared to investigate, analyse, report and archive these assets.

6.4.45 The Proposed Scheme will result in the demolition of a number of non-designated built heritage assets, including Barn Cottage and Moor Cottage, and partial demolitions at Buck's Head Farmhouse and Packington Moor Farm. A programme of built heritage works will be prepared to investigate, analyse, report and archive these assets.

6.4.46 The Proposed Scheme will sever elements of the historic landscape, for example hedgerows at the Middleton Estate boundary, Weeford parish boundary, along Knox's Grave Lane, and at the Shirrall, Bangley and Drayton deer park boundaries; and ancient woodland, primarily at the Rookery and Roundhill Wood.

## 6.5 Effects arising from operation

### Avoidance and mitigation measures

6.5.1 The following design measures have been incorporated into the design of the Proposed Scheme to reduce the impacts and effects on assets:

- noise mitigation measures have been included within the scheme design to reduce potential impacts on identified assets e.g. noise barriers on the Black Brook viaduct reducing impacts on Bourne House and Lodge (DHW234); and
- landscape planting will increasingly reduce impacts on the setting of the designated assets within the study area as it matures during the operational phase e.g. in the landscape to the west of Hints (DHW360).

### Assessment of impacts and effects

6.5.2 The assessment considers the Proposed Scheme once operational and all effects are considered to be permanent. There will be no physical impacts on buried archaeological remains or other heritage assets arising from the operation of the Proposed Scheme. Impacts on the setting of heritage assets arising from the physical presence of the Proposed Scheme are described as permanent occurring within the construction phase and are not repeated in detail here, albeit that they will endure through the operation of the Proposed Scheme. Where there is a combined effect on the setting of an asset from the presence of the constructed scheme and its operation, this is reported in the assessment of operation.

6.5.3 Significant environmental effects will occur as a result of permanent changes to the setting of the assets described below arising from the impacts of railway operation.

6.5.4 Horsley Brook Farm (DHW045), an asset of moderate value, will experience significant train noise, affecting the asset's quiet rural setting. This will result in a medium adverse impact. There will also be a medium adverse permanent construction impact

as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a medium adverse impact and moderate adverse effect.

6.5.5 Ingleyhill Farmhouse and barn (DHW042), an asset of moderate value, will experience an introduction of train noise, slightly affecting the asset's quiet rural setting. This will result in a low adverse impact. There will also be a medium adverse permanent construction impact as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a medium adverse impact and moderate adverse effect.

6.5.6 Buck's Head Farm (DHW057), a listed building Grade II and of moderate value, will experience an impact on its setting due to the visual presence of the operational scheme. There will also be an increase in noise, adding to current noise from the A5 and Watling Street. This will result in a low adverse impact. There will also be a high adverse permanent construction impact as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a high adverse impact and major adverse effect.

6.5.7 Packington Moor Farm (DHW214), an asset of moderate value, will experience an increase in noise, affecting the asset's quiet rural setting. This will result in a low adverse impact. There will also be a high adverse permanent construction impact as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a high adverse impact and major adverse effect.

6.5.8 Hints village (DHW360), an asset of moderate value, will have long views of the trains from key viewpoints north of the village. There will be an introduction of train noise close to the stream valley. This will result in a low adverse impact. There will also be a medium adverse permanent construction impact as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a medium adverse impact and moderate adverse effect.

6.5.9 Roundhill ancient woodland (DHW119), an asset of high value, will experience an increase in noise audible from within the south-western part of the wood). This will result in a low adverse impact. There will be a high adverse permanent construction impact as a result of changes to the asset. The combined presence and operation of the Proposed Scheme will result in a high adverse impact and major adverse effect.

6.5.10 Rookery ancient woodland (DHW123), an asset of high value, will experience an increase in noise audible from within the wood. This will result in a low adverse impact. There will be a high adverse permanent construction impact as a result of changes to the asset. The combined presence and operation of the Proposed Scheme will result in a high adverse impact and major adverse effect.

6.5.11 Draytonlane End Farm, the A453 Sutton Road (DHW262), an asset of low value, will lie adjacent to the Proposed Scheme. There will be an increase in noise due to the

introduction of trains. This will result in a low adverse impact. There will also be high adverse permanent construction impact as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a high adverse impact and moderate adverse effect.

6.5.12 Stone House, Drayton Lane (DHW265), an asset of moderate value, will experience an increase in noise in what is otherwise a quiet setting. The trains will be visible, resulting in a medium adverse impact. There will also be a high adverse permanent construction impact as a result of changes to the setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a high adverse impact and major adverse effect.

6.5.13 Bourne House (DHW234), an asset of moderate value, will experience an increase in noise due to the introduction of trains. This will result in a medium adverse impact. There will also be a medium adverse permanent construction impact as a result of changes to the physical setting of the asset. The combined presence and operation of the Proposed Scheme will adversely alter key characteristics of the setting of this asset, resulting in a medium adverse impact and moderate adverse effect.

## Cumulative effects

6.5.14 During the operational phase of the Proposed Scheme, cumulative development projects described in Volume 5: Appendix CT-004-000 include construction of HS2 Phase Two. Assessment of inter-project effects on cultural heritage assets arising from the interaction of the Proposed Scheme with cumulative development projects has been undertaken. No significant cumulative effects have been identified in relation to cultural heritage.

## Other mitigation measures

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

## Summary of likely residual significant effects

6.5.16 The setting of several historic settlements, buildings and landscapes will be affected visually and by noise once the Proposed Scheme becomes operational. This includes Hints Village, Horsley Brook Farm, Buck's Head Farm, Ingleyhill Farm, Roundhill Wood, the Rookery, Bourne House, Packington Moor Farm, Draytonlane End Farm, and Stone House. In due course the visual effects of the Proposed Scheme will reduce as planting matures and the new railway assimilates into the landscape.

# 7 Ecology

## 7.1 Introduction

7.1.1 This section describes the ecological baseline and identifies likely impacts and significant ecological effects that will arise from the construction and operation of the Proposed Scheme. These include impacts on species, habitats and sites designated for their importance for nature conservation.

7.1.2 The principal ecological issues in this area are: habitat loss within three Sites of Biological Importance (SBI), comprising Waggoner's Lane (Hedge 1) SBI, Rookery SBI (ancient woodland) and Roundhill Wood SBI (ancient woodland); and loss of habitat used by barn owls.

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

- results of ecological surveys (Volume 5: Appendix EC-001-003, EC-002-003, EC-003-003, and EC-004-003); and
- register of local/parish level effects which are not reported individually in Volume 2 (Volume 5: Appendix EC-005-003).

7.1.4 As well as survey data, the assessment draws on existing information gathered from national organisations and from regional and local sources including: Staffordshire Wildlife Trust, the Environment Agency and Staffordshire Ecological Record.

## 7.2 Scope, assumptions and limitations

7.2.1 The scope and methodology of the ecological assessment are introduced in the SMR (Volume 5: Appendix CT-001-000/1) and SMR Addendum (Volume 5: Appendix CT-001-000/2). Further detail, including the study area for individual surveys, is provided within the SMR Addendum. The assessment methodology is summarised in Section 8 of Volume 1, along with route-wide assumptions and limitations. Limitations associated with particular surveys are described within the relevant baseline survey report in Volume 5: Appendices EC-001-003, EC-002-003, EC-003-003, and EC-004-003.

7.2.2 A Water Framework Directive assessment has been undertaken in conjunction with the environmental assessment. Details of this assessment are presented in Volume 5: Appendix WR-001-000.

7.2.3 Access was not obtained to all of the land where general habitat survey (Phase 1 habitat survey) was proposed. Locations with the potential to support key ecological receptors where access could not be gained for survey include the Rookery SBI, Job's Hill Plantation, and some buildings which are likely to have low potential as bat roosts to be demolished along Flats Lane. Further details are provided in Volume 5: Appendices EC-001-003, EC-002-003, EC-003-003, and EC-004-003.

7.2.4 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.

7.2.5 The precautionary approach to the assessment has been adopted to identify the likely significant ecological effects of the Proposed Scheme.

## 7.3 Environmental baseline

### Existing baseline

7.3.1 This section describes the ecological baseline relevant to the assessment: the designated sites, habitats and species recorded in this area. Further details are provided in the reports and maps presented in Volume 5: Appendices EC-001-003 through EC-004-003 and Volume 5: Map Book – Ecology, Maps EC-01 to EC-12. Statutory and non-statutory designated sites are shown on Volume 5: Map Book – Ecology, Maps EC-01.

7.3.2 Land required for the construction of the Proposed Scheme and that adjacent to it mainly consists of mixed arable fields with hedgerows and tree lines. Much of the remainder is improved grassland with some amenity grassland. There are also blocks of broadleaved semi-natural woodland and coniferous plantation, particularly on the hills west of Hints, including the Rookery, Roundhill Wood and Job's Hill Plantation. The route of the Proposed Scheme crosses a series of watercourses including Gallows Brook, Black Brook and unnamed tributaries.

#### *Designated Sites*

7.3.3 There are no statutory designated sites located within 500m of the land required for the construction of the Proposed Scheme.

7.3.4 There are nine non-statutory designated sites, comprising six Sites of Biological Importance (SBI) and three Biodiversity Alert Sites (BAS), relevant to the assessment in this area; each is of county/metropolitan value. These designated sites are:

- Rookery SBI – consists of ancient semi-natural woodland. It is described as birch/oak woodland with a shrub layer dominated by rhododendron. It lies partially within the land required for construction of the Proposed Scheme;
- Waggoner's Lane (Hedge 1) SBI – is situated on the eastern boundary of Bangley Lane (known locally and referred to in the name of the designated site as Waggoner's Lane) opposite White House Farm. Structurally the hedge is valued in particular for its large width, height and shape. It lies partially within the land required for construction of the Proposed Scheme;
- Roundhill Wood SBI – contains fairly open wood with oak, birch and sycamore with a bracken-dominated ground flora and large areas of rhododendron. It lies partially within the land required for construction of the Proposed Scheme;
- Black Brook Corridor: Black Brook Bridge – Heart of England Way BAS contains the Black Brook, a small, relatively slow-flowing gravel and pebble bed river. The bank tops are lined with a band of ruderal vegetation and alders are scattered along both sides of the brook. Water crowfoot is abundant in the channel. The designated site also includes areas of grassland and woodland. The land required for construction of the Proposed Scheme crosses the corridor of the Brook;

- Snake's Hill and River Oxbow, Black Brook SBI – contains woodland at Snake's Hill, woodland along the banks of the brook and an area of marshy grassland. It lies adjacent to the land required for the construction of the Proposed Scheme;
- Bourne Brook Corridor, Ford (Oxbow Woodland) to Botley House BAS – immediately downstream of Snake's Hill and River Oxbow, Black Brook SBI. It contains alder carr, a fishing lake, grassland and the brook. It is located adjacent to the land required for the construction of the Proposed Scheme;
- Bourne Brook Corridor, Botley House to Bourne Bridge BAS – the notable features of the BAS are the brook and the Osier Beds wet woodland. It lies adjacent to the land required for the construction of the Proposed Scheme;
- Rough Leasow SBI – a conifer/broadleaved plantation on an ancient woodland site. It lies to the west of the land required for the construction of the Proposed Scheme, adjacent to an area where new woodland will be planted; and
- Moor Covert and Pool SBI – contains mixed deciduous and conifer plantation with an adjacent pool. The feeder stream to the pool originates from within the land required for the construction of the Proposed Scheme and the SBI is adjacent to land required for the construction of the Proposed Scheme.

7.3.5 In addition to Rookery SBI there are two other ancient woodland sites that are partially within the land required for the construction of the Proposed Scheme. Roundhill Wood SBI contains woodland recorded as ancient semi-natural woodland, although it appears to have been replanted. To the west of Brockhurst Lane (known locally as Rookery Lane) there is an area of plantation on an ancient woodland site at Weeford Park (Volume 5: Map Book – Ecology, Map EC-01-060, G10). Ancient woodlands represent an irreplaceable resource.

### *Habitats*

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

#### Woodland

7.3.7 Roundhill Wood SBI contains lowland mixed deciduous woodland, which is a habitat of principal importance identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)[20]. This woodland is dominated by a high forest canopy of even-aged sycamore. It contains areas recorded as ancient semi-natural woodland. Remnants of native canopy are a minor constituent of the wood, and include pedunculate oak, ash, and birch, some of the latter present as standing dead wood. Rhododendron is dominant in the lower shrub layer and elsewhere Himalayan balsam is spreading along paths, particularly on the south-facing aspects. National Vegetation Classification[21] (NVC) surveys carried out identified most of the woodland as the oak woodland community W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus*, although it is a species-poor example of this community. This woodland is of county/metropolitan value.

[20] *Natural Environment and Rural Communities Act 2006* (Chapter 16). London, Her Majesty's Stationery Office.
[21] NVC is a detailed survey and classification system that is used to compare plant communities with a range of defined community types.

7.3.8 The Rookery SBI was not surveyed in detail due to access restrictions, although details are given in the designated site section above. Part of this habitat comprises lowland mixed deciduous woodland, a habitat of principal importance. This woodland is of county/metropolitan value.

7.3.9 Within Moor Covert and Pool SBI, the woodland contains species-poor oak woodland W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* with a canopy dominated by sycamore. The woodland and pool together form a habitat mosaic of county/metropolitan value.

7.3.10 Job's Hill Plantation is partially within land required for the construction of the Proposed Scheme. This woodland is plantation that is predominantly coniferous, but has a small proportion of broadleaved trees. It is situated on high ground above the Black Brook and due to its size and proximity to ancient woodlands, from which woodland species could colonise it, and the value of woodlands in an area dominated by arable fields and improved grassland, it is considered to be of district/borough value.

### Hedgerows

7.3.11 Four hedgerows have been noted within the land required for construction of the Proposed Scheme that are ecologically important because they meet the landscape and wildlife criteria of the Hedgerows Regulations 1997[22]. These include Waggoner's Lane (Hedge 1) SBI. The hedge also had a small ditch and a grass verge of over 2m on both sides. This hedge is of county/metropolitan value. This hedge also qualifies under the archaeological and historical criteria defined in the Hedgerows Regulations, as explained in Section 6, Cultural heritage.

7.3.12 The other three ecologically important hedgerows are east of Hill Farm, north of Drayton Bassett (Volume 5: Map Book – Ecology, Map EC-10-117, C6); north of Oak Farm, near Drayton Bassett (Volume 5: Map Book – Ecology, Map EC-10-117, C6); and west of Whittington Barracks (Volume 5: Map Book – Ecology, Map EC-10-123b, I6). These hedgerows and Waggoner's Lane (Hedge 1) SBI qualify as a habitat of principal importance. While the three hedgerows described above are not as large and diverse as Waggoner's Lane (Hedge 1) SBI, hedgerows that meet the wildlife criteria of the Hedgerow Regulations 1997 criteria are less abundant and these three hedgerows are therefore of district/borough value.

7.3.13 Many of the hedgerows surveyed within this area are species-poor, sparse and contain few or no mature trees; these are individually considered to be of local/parish value. However, due to the wildlife corridors created by hedgerows, the hedgerow network within the land required for the construction of the Proposed Scheme is of district/borough value.

### Wetlands

7.3.14 Hints Meadow East is a field within Snake's Hill and River Oxbow, Black Brook SBI and is shown on Volume 5: Map Book – Ecology, Map EC-10-120, E5. A NVC survey identified that Hints Meadow East contains marshy grassland and wet woodland, and agriculturally improved grassland. The marshy grassland and wet woodland are

[22] *The Hedgerows Regulations 1997* (1997 No. 1160).Her Majesty's Stationery Office. London.

habitats of principal importance, with the marshy grassland fitting into the habitat type of coastal and floodplain grazing marsh. There is species-rich swamp vegetation most closely resembling S12 *Typha latifolia* swamp, with smaller areas of other types of swamp vegetation. The wet woodland is dominated by alder and forms the alder wood community W5 *Alnus glutinosa-Carex paniculata*. As a habitat mosaic these wetland habitats are of county/metropolitan value.

7.3.15 Hints Meadow West adjacent to Job's Hill is a field to the west of Snake's Hill and River Oxbow, Black Brook SBI and is shown on Volume 5: Map Book – Ecology, Map EC-10-120, D5. Hints Meadow West adjacent to Job's Hill contains marshy grassland fitting into the habitat type of coastal and floodplain grazing marsh, a habitat of principal importance, at the northern end of the field, whilst the southern end has wet areas where swamp vegetation has established. Vegetation communities present include: MG10a *Holcus lanatus-Juncus effusus* marshy grassland, and S28 *Phalaris arundinacea* tall herb fen community. The vegetation is considered to be of similar value to the rush pasture at Hints Meadow East (within Snake's Hill and River Oxbow, Black Brook SBI), and is of county/metropolitan value.

### Watercourses

7.3.16 The Proposed Scheme crosses the Black Brook, two unnamed tributary watercourses of the Bourne Brook, the Gallows Brook, and two unnamed tributary watercourses of the River Tame. An unnamed tributary of the Black Brook and an additional unnamed tributary of the Bourne Brook are within the land required for the construction of the Proposed Scheme, but are not crossed by the route. All of these watercourses form wildlife corridors through a largely agricultural landscape.

7.3.17 The surveyed stretch of the Black Brook lies within the Black Brook Corridor: Black Brook Bridge – Heart of England Way BAS. Surveys found that it contains a mixture of habitats and the brook is slow-flowing with a gravel and pebble bed. The brook also contained features including leaf debris dams, eroding cliffs, pools, associated water meadows, and side bars. A plant that is rare in Staffordshire[23], horned pondweed, was recorded. The Black Brook Corridor is considered to be of county/metropolitan value.

7.3.18 The unnamed tributary watercourse of the River Tame, close to the confluence with Gallows Brook north of Middleton supports a range of habitats and is considered to be of district/borough value.

7.3.19 The unnamed tributary watercourse of the Black Brook through Buck's Head Farm, south of the A5, Weeford, is heavily modified, with no aquatic plants recorded and marginal habitat dominated by terrestrial plants. The intrinsic ecological value of this tributary is limited. However, due to its direct connectivity with the Black Brook Corridor: Black Brook Bridge – Heart of England Way BAS and the fact that it provides a wildlife corridor, it is considered to be of local/parish value.

7.3.20 The Gallows Brook, near Upper House Farm north of Middleton, has been straightened and re-sectioned throughout; the reach surveyed supports only common aquatic plants, with silt dominating the bed and little variation in flow. Although it

[23] Hawksford, J. E. (2013). A Checklist of the Flora of Staffordshire. In the checklist, plants are listed as Very Common, Common, Frequent, Uncommon, Rare, or Very Rare. A plant that is 'rare in Staffordshire' has been recorded in 9 to 38 tetrads (2km squares).

supports a limited range of habitats, the watercourse provides a wildlife corridor, and is considered to be of local/parish value.

7.3.21 Access constraints prevented survey of the unnamed tributary watercourse of the Tame (north of Shirrall Hall Farm and crossed by the A453) and the unnamed tributary watercourse of the Bourne Brook (through Hints Farm). However, Ordnance Survey mapping and aerial photography shows that these minor watercourses have been historically straightened. Due to the limited range of habitats likely to be supported within these modified watercourses, they are considered to be of up to local/parish value.

7.3.22 An unnamed tributary of the Bourne Brook crossed by the route and the unnamed tributary of the Bourne Brook not crossed (but within the land required) were screened out of specialist survey. These watercourses are of negligible value.

### Water bodies

7.3.23 There are 22 water bodies within the land required for the construction of the Proposed Scheme, including ponds and ditches.

7.3.24 A pond, adjacent to the Bourne Brook east of Hints and just outside of the land required for construction of the Proposed Scheme, would meet the criteria for designation as a BAS[24] apart from the presence of the non-native invasive plant Himalayan balsam. Common club-rush, a Staffordshire uncommon plant[25], was recorded in this pond. This pond would qualify as a habitat of principle importance and is of district/borough value. No other ponds which have been surveyed currently meet the selection criteria for BAS in Staffordshire based on habitat alone.

7.3.25 As a precautionary assessment water bodies that have not been accessed for survey are considered to be of up to district/borough value.

7.3.26 Ponds south of Oak Tree Farm and near Draytonlane End Farm south of the A453 Sutton Road were found to support only plant communities of low species richness. Curly pondweed, a Staffordshire uncommon plant, was recorded in the second of these ponds. Due to the intrinsic value of ponds in an otherwise arable landscape, these are assessed as having local/parish value.

7.3.27 Eleven ponds which have had a Phase 1 habitat survey but which have been scoped out of further detailed habitat survey are assessed as having local/parish value.

### Other Habitats

7.3.28 Other habitat types present within the area, including grassland and scrub, are of up to local/parish value. Arable land is found across the land required for the construction and operation of the Proposed Scheme. No species-rich arable margins have been noted and the arable land largely comprises heavily managed large fields with few features of interest to wildlife. This habitat is considered to have negligible value.

[24] Staffordshire Wildlife Trust (2011), *Guidelines for the Selection of Sites of County Biological Importance in Staffordshire*. February 2008, Version 4.02 (May 2011).
[25] Hawksford, J. E. (2013), A Checklist of the Flora of Staffordshire. In the checklist, plants are listed as Very Common, Common, Frequent, Uncommon, Rare, or Very Rare. 'Uncommon' plants have been found in 39 to 109 tetrads (2km squares).

## *Protected and/or notable species*

7.3.29 A summary of the species relevant to the assessment is provided in Table 13.

Table 13: Protected and/or notable species

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| Bats | Up to regional | Potential assemblage of rarer bat species associated with roosting habitat at Rookery and Job's Hill Plantation | Plantation and semi-natural woodlands dominated by coniferous species and silver birch with scattered broadleaved trees. No access has been available to survey potential tree roosts. Activity and static surveys on the periphery of these woodlands confirm a range of species including common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species and noctule which may roost within trees within the woodlands.<br><br>Brown long-eared bat, soprano pipistrelle and noctule are species of principal importance identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)[26].<br><br>It is assumed that the woods at Rookery could support breeding colonies of both common and 'rarer'[27] species based upon the assemblage recorded within the area. This woodland is within the land required for construction of the Proposed Scheme. |
| | County/metropolitan | Natterer's bat population at a farm near Hints (EC-05-060, C7) | Five buildings within the land required for construction of the Proposed Scheme were each found to support a small number of Natterer's bat, likely summer (non-breeding) roosts. A peak count of two Natterer's bats was recorded emerging from one building; all other building roosts were confirmed through DNA analysis of bat droppings only. Dropping numbers and distribution were consistent with small summer non-breeding or transient roost sites. A review of committed developments found that three of the buildings within the complex had been identified as building roosts for this species in 2009. A peak count of two *Myotis* species was recorded emerging from a sixth building within the same complex of buildings, no droppings were found to confirm species but it is assumed likely to be Natterer's.<br><br>Natterer's are categorised as a 'rarer' bat species in England. |

[26] *Natural Environment and Rural Communities Act 2006* (Chapter 16). London, Her Majesty's Stationery Office.
[27] Numbers of bats between 10,000 and 100,000 individuals based on Wray S, Wells D, Long E and Mitchell-Jones T. (2010), Valuing bats in ecological impact assessment. In Practice. December 2010. P23-25.

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | Up to county/metropolitan | Population of bats using one tree roost along a hedgerow within arable habitats north of Cranesbrook Hill Road | One tree roost has been confirmed through a small number of droppings found during a tree inspection survey. Species is unknown, but potentially supports individuals of 'rarer' bat species confirmed using habitats in proximity to the north and south of the roost. The tree is within the land required for the construction of the Proposed Scheme. |
| | District/borough | Assemblage of bats using foraging and commuting habitats bounded by A5 and A51, centred on Packington Moor Farm, including Tamworth Lane and Knox's Grave Lane | A diverse assemblage of bats recorded within habitats within the land required for the construction of the Proposed Scheme including: common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species, noctule and Nathusius' pipistrelle. Bats were recorded foraging and commuting along hedgerows, field boundaries and occasional copses within a largely arable landscape.<br><br>A low density of trees with moderate and high roosting potential was recorded in hedgerows.<br><br>Brown long-eared bat is common and widely distributed within the UK, and together with soprano pipistrelle, is a species of principal importance. Noctule bat, recorded in relatively low numbers during transect and static surveys, is categorised as a rarer bat species within England and is a species of principal importance. A very small number of passes by Nathusius' pipistrelle, a rarer bat species, were recorded during static surveys indicative of passage or transient use rather than core foraging or commuting habitat. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | District/borough | Assemblage of bats using foraging and commuting habitats bounded by A5 and A543, centred on Hints (including Roundhill Wood and the Black-Bourne Brook, and along the woodland edges of the Rookery and Job's Hill Plantation and hedgerows) | A diverse assemblage of bats recorded within habitats required for the construction of the Proposed Scheme including: common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species, noctule, Leisler's bat and Nathusius' pipistrelle. Bats were recorded foraging and commuting in and around woodlands, hedgerows, field boundaries and occasional copses within a pasture field dominated landscape. Noctule bat regularly recorded in low numbers during transect and static surveys. A small number of passes by Leisler's bats, a rare species in England, and Nathusius' pipistrelle recorded during static surveys, were indicative of passage or transient use rather than core foraging or commuting habitat.<br><br>One tree with high potential to support roosting bats was found within Roundhill Wood, outside of the land required for construction of the Proposed Scheme. An assessment of trees within Roundhill Wood and along the network of hedgerows found a low density of trees with moderate potential to provide suitable roosting opportunities. The majority of trees were found to have low or negligible potential to support roosting bats. |
| | District/borough | Assemblage of bats using foraging and commuting habitats along hedgerows and field boundaries bounded by A453 Sutton Road and Drayton Lane | A diverse assemblage of bats recorded within habitats required for the construction of the Proposed Scheme including: common pipistrelle, soprano pipistrelle, *Myotis* species, noctule and Leisler's bat.<br><br>Common pipistrelle and soprano pipistrelle were recorded foraging and commuting along hedgerows and field boundaries within a largely arable landscape. Noctule bat regularly recorded in relatively low numbers during transect and static surveys. A small number of passes by Leisler's bats recorded during static surveys indicative of passage or transient use rather than core foraging or commuting habitat.<br><br>A low density of trees with moderate roosting potential and one with high potential was recorded in hedgerows.<br><br>There are bat roosts along Drayton Lane, although these are described as a separate receptor as they support a bat population of local/parish value. It is likely that commuting and foraging habitats bound by A453 Sutton Road and Drayton Lane will support bats using these roosts due to their proximity. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | District/borough | Assemblage of bats using foraging and commuting habitats comprising Gallows Brook, hedgerows, field boundaries, occasional copses and water bodies, south-west of Drayton Bassett | A diverse assemblage recorded within habitats required for the construction of the Proposed Scheme including: common pipistrelle, soprano pipistrelle, brown long-eared bats, *Myotis* species, noctule, Leisler's bat and Nathusius' pipistrelle.<br><br>Common and soprano pipistrelles and occasional brown long-eared bats were recorded foraging and commuting associated with Gallows Brook, hedgerows, field boundaries, occasional copses and water bodies derived from disused marl pits within an arable-dominated landscape. Noctule bats were recorded in relatively low numbers during both transect and static surveys. A small number of passes by Leisler's bats and Nathusius' pipistrelle recorded during static surveys, indicative of passage or transient use rather than core foraging or commuting habitat. |
| | Local/parish | Common pipistrelle population using roosts at a Farm, near Hints | Three buildings within the land required for construction of the Proposed Scheme were each found to support a small non-breeding roost probably used by males and/or non-breeding females with a peak emergence of between one and three individuals. The local valuation is used because of the small number of bats and the fact that common pipistrelle is a common and widely distributed species within the UK. |
| | Local/parish | Brown long-eared bat population using roosts at a Farm, near Hints | Three buildings within the land required for construction of the Proposed Scheme were each found to support roosts probably used by males and/or non-breeding females, identified through DNA analysis of droppings. The number and distribution of droppings in two buildings is consistent with small non-breeding summer roosts, the third is identified as a feeding perch only due to the presence of a small number of droppings along with butterfly and moth wings. |
| | Local/parish | Common pipistrelle population using a roost at a farm near Packington Moor | One building, outside of the land required for construction of the Proposed Scheme, used by roosting bats in summer with a peak emergence count of two, probably used by males and/or non-breeding females. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | Local/parish | Common pipistrelle and brown long-eared population using buildings roosts along Drayton Lane, north-west of Drayton Bassett | One residential building and one barn found to be used in summer by small numbers of common pipistrelle and brown long-eared bats (peak emergence count of one to three individuals), probably used by males and/or non-breeding females.<br><br>A second residential building was found with 50 scattered droppings indicating a probable non-breeding summer roost for common bat species (likely pipistrelle/brown long-eared). All of these buildings are within the land required for construction of the Proposed Scheme. |
| Water vole | County/metropolitan | Population using pond (associated with Black Brook at Hints) (EC-12-116b, F3) | Positive evidence (feeding signs and a possible burrow) on a water body adjacent to the Black Brook and outside of the land required for construction of the Proposed Scheme. Although there are desk study records for the Black-Bourne Brook (the most recent being from 2008), there was no survey evidence on the Black-Bourne Brook. However due to the proximity of the brook to the water body it could be used as a commuting corridor for water vole.<br><br>Water vole, a species of principal importance, is in decline within Staffordshire. Remaining water vole populations in Staffordshire are limited and are vulnerable to a range of factors. |
| Birds | County/metropolitan | Breeding barn owl at three sites. Two sites to the south-east of Lichfield and one site to the south-west of Tamworth | Two traditional[28] barn owl nest sites were identified within arable farms to the south-east of Lichfield. One nest site was within and one was adjacent to the land required for construction of the Proposed Scheme. A further nest site was identified within a farm to the south-west of Tamworth. This nest is outside the land required for construction of the Proposed Scheme. Each pair of barn owls constitutes more than 1% of the estimated county breeding population. Barn owl is a Schedule 1 species[29]. |
| | County/metropolitan | Breeding hobby to the south-west of Tamworth | A hobby nest site was identified within an arable farm to the south-west of Tamworth. This nest is outside the land required for construction of the Proposed Scheme. A pair of hobbies constitutes more than 1% of the estimated county breeding population. Hobby is a Schedule 1 species. |

[28] A traditional nest site is one that has been regularly used in previous years but not found to be occupied at the time of the surveys to support the assessment.

[29] Schedule 1 birds receive full protection under the *Wildlife and Countryside Act 1981* (as amended). In addition to the protection from killing or taking that all birds, their nests and eggs have under the Act, Schedule 1 birds and their young must not be disturbed at the nest.

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | County/metropolitan | Population of breeding corn bunting at Buck's Head Farm, to the east of Weeford | Five pairs of corn bunting were recorded breeding at Buck's Head Farm, using habitats within the land required for construction of the Proposed Scheme. This population is thought to constitute more than 1% of the estimated county breeding population. Corn bunting is a species of principal importance. |
| | County/metropolitan | Population of breeding tree sparrow at Buck's Head Farm, to the east of Weeford | Up to nine pairs of tree sparrow were recorded breeding at Buck's Head Farm, using habitats within the land required for construction of the Proposed Scheme. This population is thought to constitute more than 1% of the estimated county breeding population. Tree sparrow is a species of principal importance. |
| | County/metropolitan | Population of breeding tree sparrow at Packington Moor Farm, to the south-west of Whittington Heath | Up to five pairs of tree sparrow were recorded breeding at Packington Moor Farm. This population is thought to constitute more than 1% of the estimated county breeding population. Tree sparrow is a species of principal importance. |
| | County/metropolitan | Population of wintering corn bunting at Buck's Head Farm, to the east of Weeford | Site supports wintering populations of greater than 1% of county estimate for this species. This is a species of principal importance. |
| | County/metropolitan | Population of wintering grey partridge at Buck's Head Farm, to the east of Weeford | Site supports wintering populations of greater than 1% of county estimate for this species. This is a species of principal importance. |
| | County/metropolitan | Population of wintering tree sparrow at Buck's Head Farm, to the east of Weeford | Site supports wintering populations of greater than 1% of county estimate for this species. This is a species of principal importance. |
| | County/metropolitan | Population of wintering common gull at Packington Moor Farm, to the south-west of Whittington Heath | Site supports wintering populations of greater than 1% of county estimate for this species. This is an Amber listed Birds of Conservation Concern species[30]. |
| | County/metropolitan | Population of wintering lesser black-backed gull at Packington Moor Farm, to the south-west of Whittington Heath | Site supports wintering populations of greater than 1% of county estimate for this species. This is an Amber listed Birds of Conservation Concern species. |
| | District/borough | Population of breeding grey partridge at Buck's Head Farm, to the east of Weeford | Four pairs of grey partridge were recorded breeding at Buck's Head Farm. Grey partridge is a species of principal importance. This species is thought to be widespread in the regional arable landscape, and this moderate population is thought to be of district/borough value. |

[30] Gregory RD, Wilkinson NI, Noble DG, Robinson JA, Brown AF, Hughes J, Proctor DA, Gibbons DW and Galbraith CA (2002), The population status of birds in the United Kingdom, Channel Islands and the Isle of Man; an analysis of conservation concern 2002-2007. *British Birds* 95: 410-450.

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | District/borough | Population of breeding yellow wagtail at Buck's Head Farm, to the east of Weeford | Up to six pairs of yellow wagtail were recorded breeding at Buck's Head Farm. Yellow wagtail is a species of principal importance. This species is thought to be widespread in the regional arable landscape, and this moderate population is thought to be of district/borough value. |
| | Local/parish | Assemblage of breeding birds at Brook Farm, to the north of Middleton | Field surveys recorded 32 bird species within this area of which 15 are notable. Nine notable species are thought to have bred on site, including species such as linnet and yellowhammer; both are species of principal importance. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of breeding birds at Hill Farm, to the west of Drayton Bassett | Field surveys recorded 55 bird species within this area of which 20 are notable. Fifteen notable species are thought to have bred on the site, including species such as linnet and reed bunting. The reed bunting is a species of principal importance. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of breeding birds recorded along a transect covering farmland habitat between Drayton End Lane Farm and Holt Farm, to the south of Hints | Field surveys recorded 44 bird species within this area of which 20 are notable. Fifteen notable species are thought to have bred within the survey area, including species such as lapwing and yellowhammer. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of breeding birds within an arable area and Roundhill Wood, to the south-east of Hints | Field surveys recorded 52 bird species within this area of which 21 are notable. Thirteen notable species are thought to have bred on the site, including species such as kingfisher and reed bunting. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of breeding birds at Buck's Head Farm, to the east of Weeford | Field surveys recorded 76 bird species within this area of which 41 are notable. Twenty-one notable species are thought to have bred on the site, including species such as lapwing and yellowhammer. The yellowhammer is a species of principal importance. Species recorded (with the exception of corn bunting and tree sparrow, whose populations at the site are of county/metropolitan importance and grey partridge and yellow wagtail whose populations at the site are of district/borough importance) are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | Local/parish | Assemblage of breeding birds at Packington Moor Farm, to the south-west of Whittington Heath | Field surveys recorded 52 bird species within this area of which 22 are notable. Sixteen notable species are thought to have bred on the site, including species such as linnet and yellow wagtail. Species recorded (with the exception of tree sparrow whose population at the site is of county/metropolitan importance) are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of wintering birds at Brook Farm, to the north of Middleton | Field surveys recorded 39 bird species within this area of which 16 are notable, including species such as grey partridge and yellowhammer. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of wintering birds at Hill Farm, to the west of Drayton Bassett | Field surveys recorded 42 bird species within this area of which 17 are notable, including species such as kingfisher and lapwing. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of wintering birds within an arable area and Roundhill Wood, to the south-east of Hints | Field surveys recorded 52 bird species within this area of which 21 are notable, including species such as kingfisher and woodcock. Species recorded are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of wintering birds at Buck's Head Farm, to the east of Weeford | Field surveys recorded 57 bird species within this area of which 26 are notable, including species such as lesser redpoll and yellowhammer. The lesser redpoll is a species of principal importance. Species recorded (with the exception of corn bunting, grey partridge and tree sparrow whose populations at the site are of county/metropolitan importance) are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |
| | Local/parish | Assemblage of wintering birds at Packington Moor Farm, to the south-west of Whittington Heath. | Field surveys recorded 37 bird species within this area of which 12 are notable, including species such as linnet and yellowhammer. The linnet is a species of principal importance. Species recorded (with the exception of common gull and lesser black-backed gull whose populations at the site are of county/metropolitan importance) are considered to be common and widespread in the habitat types surveyed, and/or no large or important populations were recorded. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| Amphibians | County/metropolitan | Assumed great crested newt metapopulation[31] AMP26, north of Middleton | AMP 26 has a total of five water bodies, all of which have received incomplete surveys. Four of these water bodies support great crested newt, and the AMP supports a medium population size class (cumulative peak count of 23). The ponds also support smooth newt, common frog and common toad. Great crested newt and common toad are species of principal importance. This metapopulation is almost entirely within the land required for construction of the Proposed Scheme.<br><br>The records provided from Staffordshire Ecological Record indicate that great crested newt appears to be abundant within Staffordshire and, given the results collated for this area, it is likely that great crested newts are widespread within the area. However, metapopulations that support a medium population of great crested newts meet the selection criteria for SBI within Staffordshire[32]. |
| | County/metropolitan | AMP27, south-east of the A453 Sutton Road, west of Drayton Bassett | AMP27 has a total of three water bodies, all of which have been surveyed (two complete and one incomplete). The cumulative population size class for this metapopulation would be medium (peak counts of 3 and 8 in the two ponds). The ponds also support smooth newt, palmate newt and common toad. This metapopulation is outside of the land required for construction of the Proposed Scheme. |
| | Up to county/metropolitan | AMP25, south-west of Drayton Bassett | AMP25 has a total of two water bodies both supporting a small population size class of great crested newts (cumulative peak count of 8). This metapopulation has had incomplete surveys undertaken on the water bodies. It is likely that, with full surveys completed, the ponds could support a medium population size class of great crested newt which would meet the SBI selection criteria in Staffordshire. Smooth newt, common frog and common toad are also present. This metapopulation is partially within the land required for construction of the Proposed Scheme. |

[31] A great crested newt metapopulation is a group of associated populations made up from newts which both breed in the ponds and live in the terrestrial habitat around a cluster of ponds. The newts are likely to return to the same pond each year; however, there may be some interchange of newts between the ponds within the metapopulation. Assumed metapopulations (AMP) have currently been identified based on a combination of desk based information and survey results. Details of AMP are given in Volume 5: Appendix EC-002-003.

[32] Staffordshire Wildlife Trust (2011), *Guidelines for the Selection of Sites of County Biological Importance in Staffordshire*. February 2008, Version 4.02 (May 2011).

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | Up to county/metropolitan | AMP28, south of A5, east of Weeford | AMP28 has two water bodies, one of which supports a small population of great crested newts (peak count of 3). The other water body has only received a HSI survey. This metapopulation has had incomplete surveys undertaken. It is likely that, with full surveys completed, the ponds could support a medium population size class of great crested newt which would meet the SBI selection criteria for Staffordshire.<br><br>This metapopulation is almost entirely within the land required for construction of the Proposed Scheme. |
| | Up to county/metropolitan | Great crested newt populations in all water bodies not subject to full survey outside of assumed metapopulations | Using a precautionary approach, water bodies which have not been surveyed could support populations of great crested newts of medium population size class. |
| | Local/parish | Nineteen water bodies outside of assumed great crested newt metapopulations | These water bodies (surveys completed) do not contain great crested newts but support other amphibians (smooth newt, common frog and/or common toad). All of these species are considered to be widespread within Staffordshire and within the area. None of these amphibian populations meet the criteria for SBI selection in Staffordshire. |
| Otter | District/borough | Population of otter using the Black-Bourne Brook | Spraints were recorded on a pond associated with Black-Bourne Brook at Hints, outside of the land required for construction of the Proposed Scheme, and on the Black-Bourne Brook. The Black Brook is crossed by the route of the Proposed Scheme.<br><br>Otter is a species of principal importance. The species has a large home range and has increasing populations in the UK and in Staffordshire. |
| Terrestrial invertebrates | District/borough | Assemblage at Roundhill Wood | Although the habitat at Roundhill Wood SBI, which is within the land required for construction of the Proposed Scheme, is dominated by non-native sycamore and rhododendron, the invertebrate assemblage using Roundhill Wood includes a nationally scarce hoverfly. |
| | District/borough | Assemblage at Home Farm, on the southern side of Hints | Species recorded at Home Farm include a nationally scarce fungus weevil and a nationally scarce cobweb beetle sampled from trees within the land required for construction of the Proposed Scheme. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | District/borough | Assemblage at Brockhurst Lane (known locally as Rookery Lane), on the eastern side of Hints. | Species recorded at Brockhurst Lane include a nationally scarce stonefly and a nationally scarce wetland hoverfly. This site is outside of the land required for construction of the Proposed Scheme on the east side of the Black Brook. |
| | Local/parish | Assemblage at Packington Moor Farm. | *Nomada lathburia*, a nationally vulnerable[33] bee was recorded at Packington Moor Farm outside of the land required for construction of the Proposed Scheme. This species is thought to be more common than the status suggests due to a range expansion over the last 10-15 years. |
| | Local/parish | Flat's Lane, immediately to the north of the A5 at Weeford | This agricultural farm land site, adjacent to the land required for construction of the Proposed Scheme, is intensively managed with limited invertebrate interest. Species recorded were common and widespread. |
| | Local/parish | Hill Farm, north-west of Drayton Bassett | This agricultural farmland site, which is partially within the land required for construction of the Proposed Scheme, is intensively managed with limited invertebrate interest. Species recorded were common and widespread. |
| Aquatic macro-invertebrates | District/borough | Assemblage on the Gallows Brook | Surveys have identified an invertebrate community of moderate taxon richness with a fairly high conservation importance. Gallows Brook is crossed by the route of the Proposed Scheme. |
| | Up to district/borough | Assemblages on all other watercourses in the area, except on Black-Bourne Brook | In discussion with the Environment Agency, the unnamed tributary watercourse of the River Tame and the unnamed tributary watercourse of the Black Brook were identified as requiring survey although they were not available for survey due to access restrictions. Using a precautionary approach, the macro-invertebrate communities within watercourses where no access was available are assumed to have up to the highest value achieved in this area. |
| | Local/parish | Assemblage on the Black-Bourne Brook | Surveys have identified an aquatic macro-invertebrate community of relatively high taxon richness, indicative of good biological water quality, but low conservation importance. The Black Brook is crossed by the route of the Proposed Scheme. |
| Notable plants | Local/parish | Population of horned pondweed in the Black Brook | A species of plant that is rare in Staffordshire, recorded during surveys within the land required for the construction of the Proposed Scheme. |

[33] Shirt, David (1987); British Red data Books: 2. Insects; Nature Conservancy Council; Peterborough. Red Data Book category 2 – Vulnerable: Species declining throughout their range or in vulnerable habitats.

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| | Local/parish | Populations of great yellow-cress, curly pondweed and common club-rush | Population of great yellow-cress was recorded during surveys at Hints Meadow West adjacent to Job's Hill within the land required for construction of the Proposed Scheme. Population of curly pondweed was recorded during surveys of a pond near the A453 Sutton Road. Population of common club-rush was recorded during surveys in a pond adjacent to the Bourne Brook east of Hints, outside of the land required for construction of the Proposed Scheme. These are all Staffordshire uncommon species of plant. |
| Fish | Local/parish | Assemblage in the Black-Bourne Brook | Bullhead was recorded during surveys, in addition to Environment Agency records of brown trout. The Black Brook is crossed by the route of the Proposed Scheme. |
| | Up to local/parish | Assemblage in all other watercourses apart from Gallows Brook (negligible) | Watercourses other than the Black-Bourne Brook and Gallows Brook were not surveyed due to access restrictions. The only watercourse identified in discussion with the Environment Agency as requiring survey was a tributary of the Black-Bourne Brook. However, the watercourses may provide suitable habitat for commonly occurring species. Using a precautionary approach, the fish populations within watercourses where no access was available are assumed to have up to the highest value achieved for this area. |
| Badger | Local/parish | At least seven badger social groups with territories located wholly or partly within this area, six of which are partially within the land required for the construction of the Proposed Scheme | Badgers are widespread in the UK and Staffordshire. The badger social groups within the study area are not likely to form a critical part of the county or of the district population. |
| Reptiles | Up to local/parish | Areas of suitable habitat within the area | Survey at Flats Lane, Weeford found no reptiles. There are desk study records of common lizard, slow worm, grass snake and adder in the local area, which are all species of principal importance.<br><br>The arable habitat dominating the area is unsuitable for reptiles. Due to the limited and scattered nature of suitable habitat, the population of reptiles appears likely to be patchy with no good or exceptional populations and only limited and isolated patches of suitable habitat identified. |
| Hazel dormouse | Negligible | Potential populations in suitable woody habitat in the area | No hazel dormouse identified in the vicinity of the route although suitable habitat such as broadleaved woodland is present. The species is rare in Staffordshire (not recorded for three years in the county). Presence is considered unlikely. |

| Species/ species group | Value | Receptors | Baseline and rationale for evaluation |
|---|---|---|---|
| White-clawed crayfish | Negligible | Potential populations in suitable watercourses in the area | No evidence of white-clawed crayfish or non-native crayfish was found during surveys. There were no records from field survey and no records from desk study for the last two years. Presence is considered unlikely. The species has a declining presence in Staffordshire. |

### Future baseline

#### *Construction (2017)*

7.3.30 Volume 5: Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. It is not anticipated that developments will significantly affect the character and value of ecological resources within the area.

#### *Operation (2026)*

7.3.31 There are no known committed developments or changes to management in this area that will affect the operational baseline.

## 7.4 Effects arising during construction

### Avoidance and mitigation measures

7.4.1 The following measures have been included as part of the design of the Proposed Scheme and avoid or reduce impacts to features of ecological value:

- the alignment north of the A5 trunk road and the A51 Tamworth Road limits the land required for the construction of the Proposed Scheme and the number of building demolitions (some of which have the potential to support roosting bats) within Packington Moor Farm;
- use of viaduct crossings to negate the need for culverting of watercourses (on two unnamed tributaries of the River Tame, the Black-Bourne Brook and Langley Brook) thus maintaining wildlife connectivity for bats, otters and water voles. Viaducts will allow bat foraging and commuting activity to continue beneath the Proposed Scheme and may reduce habitat severance at these locations;
- watercourse diversions to reduce the length of culvert required (on the Gallows Brook and two unnamed tributary watercourses of the River Tame) to reduce extent of stream habitat loss and degree of habitat severance;
- the placement of a 3m high culvert along Gallows Brook will allow passage of commuting activity by some bat species confirmed as using this watercourse;
- avoidance of viaduct structures within the watercourse will prevent impacts to watercourse habitat, form and function;

- all culverts will be suitable to allow passage for mammals such as otter and water vole, taking into account flood events, or will have an alternative dry tunnel installed; and
- Brockhurst Lane underbridge at Hints Footpath 14 will allow bat species to cross underneath the Proposed Scheme.

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice (CoCP) (see Volume 5: Appendix CT-003-000), which includes translocation of protected species where appropriate.

## Assessment of impacts and effects

### *Designated sites*

7.4.3 At Waggoner's Lane (Hedge 1) SBI, over 55% of the length of the hedgerow is within the land required for the construction of the Proposed Scheme as a result of the permanent diversion of Bangley Lane. This loss will result in a permanent adverse effect on the integrity of the SBI which will be significant at a county/metropolitan level.

7.4.4 The Proposed Scheme will result in the permanent loss of 1.3ha of woodland within Roundhill Wood SBI, which is 30% of the 4.1ha SBI. There may be further indirect effects on the woodland as a result of the retained woodland being smaller in size and more vulnerable to degradation through edge effects, such as wind throw during storms; the edge of the woodland will be exposed on the edge of Hints cutting. Given that Roundhill Wood SBI is on top of a hill and supports no wetland habitats, it is unlikely that ground water drawdown will have any adverse impacts on the habitats for which this site is designated. The Proposed Scheme will not cause habitat fragmentation within Roundhill Wood. These impacts will result in a permanent adverse effect on the integrity of Roundhill Wood SBI, which will be significant at the county/metropolitan level.

7.4.5 The Proposed Scheme will result in the permanent loss of 2.0ha of ancient woodland within the Rookery SBI or 27% of the total 7.5ha SBI. There may be further indirect effects on the woodland as described for Roundhill Wood. Given that Rookery SBI is on top of a hill and supports no wetland habitats, it is unlikely that ground water drawdown will have any adverse impacts on the habitats for which this site is designated. The Proposed Scheme will not cause habitat fragmentation within the Rookery SBI. These impacts will result in a permanent adverse effect on the integrity of the Rookery SBI, which will be significant at the county/metropolitan level.

7.4.6 The potential for hydrological impacts on designated sites as a result of the Hints cutting or Swinfen cutting has been considered. A small section of the Black Brook Corridor: Black Brook Bridge – Heart of England Way BAS may be within the calculated zone of influence for hydrological impacts (see Section 13, Water resources and flood risk assessment) although the topography means the cutting is unlikely to affect groundwater beneath the site. There is an unnamed watercourse (a tributary of the Black Brook), within the possible range of influence of groundwater impacts. However, sustainable drainage systems (SuDS) in the form of infiltration trenches will be located to the south of Swinfen cutting near Black Brook viaduct to facilitate groundwater recharge and this is predicted to avoid significant effects on ecological

receptors. Therefore, no hydrological impacts are expected on this designated site. Localised shading would occur on the Black Brook within the Black Brook Corridor: Black Brook Bridge – Heart of England Way BAS, but this would not have a significant effect on the integrity of the designated site.

7.4.7 The boundary of the land required for the construction of the Proposed Scheme includes land within Bourne Brook Corridor, Botley House to Bourne Bridge BAS and Snake's Hill and River Oxbow, Black Brook SBI, but these are for access only and do not involve actual habitat loss or engineering works. Snake's Hill and River Oxbow – Black Brook SBI and Bourne Brook Corridor, Ford (Oxbow Woodland) to Botley House BAS are not within the zone of influence for hydrological impacts. Therefore, no hydrological impacts are expected on either of these designated sites.

7.4.8 There will be no land required for the construction of the Proposed Scheme within Moor Covert and Pool SBI. Although this site is close to the Swinfen cutting, the depth of cutting is shallow. This reduces the volume of groundwater abstracted and no significant effect on the integrity of Moor Covert and Pool SBI is expected. There will be land required to the east and south-east of Moor Covert, outside the SBI, in order to provide an infiltration trench with an overflow into the existing ditch on the site boundary. The creation of the infiltration trench will maintain the current water regime by allowing storm water to discharge to ground and allowing surface water to discharge to the existing ditch in extreme events. This is not expected to affect the water balance within the SBI.

7.4.9 No significant effects are expected on the integrity of the following designated sites which form part of the baseline: Black Brook Corridor: Black Brook Bridge – Heart of England Way BAS; Snake's Hill and River Oxbow, Black Brook SBI; Bourne Brook Corridor, Ford (Oxbow Woodland) to Botley House BAS; Bourne Brook Corridor, Botley House to Bourne Bridge BAS; Rough Leasow SBI; and Moor Covert and Pool SBI.

### *Habitats*

7.4.10 The Proposed Scheme will result in the permanent loss of 1.3ha of ancient semi-natural woodland within Roundhill Wood SBI, which is 30% of the woodland. There may be further indirect effects on the woodland as a result of the retained woodland being smaller in size and more vulnerable to degradation through edge effects, such as wind throw during storms; the edge of the woodland will be exposed on the edge of Hints cutting. The Proposed Scheme will not cause habitat fragmentation within Roundhill Wood. These impacts will result in a permanent adverse effect on the conservation status of woodland at Roundhill Wood, which will be significant at the county/metropolitan level.

7.4.11 The Proposed Scheme will result in the permanent loss of 2.0ha of ancient woodland within the Rookery SBI or 27% of the total 7.5ha woodland site. There may be further indirect effects on the woodland as described for Roundhill Wood. The Proposed Scheme will not cause habitat fragmentation within the Rookery. These impacts will result in a permanent adverse effect on the conservation status of woodland at the Rookery, which will be significant at the county/metropolitan level.

7.4.12 The land required for the construction of the Proposed Scheme includes 1.4 ha of the replanted ancient woodland at Weeford Park. The whole of the replanted ancient woodland at Weeford Park is 28.4 ha in area, so the woodland within the land required for construction of the Proposed Scheme is 5% of the whole site. This land is within the land required for construction of the Proposed Scheme as part of the corridor for works on existing overhead utilities. Aerial photography indicates an existing wayleave, or a strip cleared for other reasons, through the woodland. The only works would be re-tensioning of the power lines. It is expected that these works could be undertaken with no impact to the ancient woodland site.

7.4.13 The total area of woodland of all types within the land required for the construction of the Proposed Scheme is 8.1 ha. This includes the losses of ancient woodland at Roundhill Wood and the Rookery, which are described above. There will be a loss of some very small localised areas of secondary woodland. Losses of woodland at a local/parish level are reported in Volume 5: Appendix EC-005-003.There would be one larger area of secondary woodland loss, at the eastern edge of Job's Hill Plantation, where 1.1ha would be lost. This would be approximately 10% of the secondary woodland. These impacts will result in a permanent adverse effect on the conservation status of the woodland, which will be significant at up to the district/borough level.

7.4.14 There will be direct loss of 2.6ha of species-rich rush pasture and swamp habitat at Hints Meadow West adjacent to Job's Hill. All of the rush pasture within this field lies within the land required for the construction of the Proposed Scheme. This loss will cause an adverse effect on the conservation status of the habitat which will be significant at the county/metropolitan level.

7.4.15 There are 26.5km of hedgerows within the land required for the construction of the Proposed Scheme. This includes 1.1km from four individual hedgerows that meet the wildlife and landscape criteria of the Hedgerow Regulations (1997). However, the majority of hedgerows within the land required for construction of the Proposed Scheme are species-poor. The loss of hedgerows includes over 55% of the length of the hedgerow at Waggoner's Lane (Hedge 1) SBI. This loss will result in a permanent adverse effect on the conservations status of the hedgerow, which will be significant at a county/metropolitan level.

7.4.16 The final length of hedgerow to be lost will depend on the detailed design and they will be retained where practical, but as a precautionary approach for the purposes of the assessment it is assumed that all of the hedgerows would be lost. The combined loss and severance of hedgerows within the land required for the construction of the Proposed Scheme will cause an adverse effect on the conservation status of hedgerows which will be significant at a district/borough level.

7.4.17 The loss of the pond adjacent to the Bourne Brook east of Hints, the pond near the A453 Sutton Road and the pond near Brockhurst Lane (known locally as Rookery Lane) will result in a permanent adverse effect on the conservation status of each pond that will be significant at the district/borough level.

7.4.18 Taking a precautionary approach to assessment, loss of a further 13 ponds where survey was not undertaken due to access constraints could result in a permanent

adverse effect on the conservation status of each water body that would be significant at up to the district/borough level.

7.4.19 It is considered unlikely that any other effects on habitat receptors significant at more than the local/parish level will occur. Effects significant at the local/parish level are listed in Volume 2: Appendix EC-005-003.

### *Species*

7.4.20 The removal or disturbance of habitat features that are utilised by bats during breeding, hibernation or migrating between roosts are considered to have the potential to result in adverse effects on the bat populations or assemblages during construction. However, the point at which such impacts are considered likely to result in a significant adverse effect on the conservation status of the population concerned will differ dependent on the status of the species concerned.

7.4.21 The impact of disturbance on bat populations will generally be localised and limited to the period of construction. Bats utilising retained habitats may be subject to irregular and localised disturbance from lighting and noise during the construction period where works in autumn, winter and spring may be carried out for short periods after dusk or prior to dawn. These impacts would only temporarily deter bats from using foraging and commuting habitats.

7.4.22 One confirmed bat roost for common pipistrelle will be lost within the land required for construction of the Proposed Scheme due to the demolition of a building at Packington Moor. Given that only small numbers of bats were found to use the buildings as a transient non-breeding roost, the loss of the buildings will not significantly affect the conservation status of pipistrelle.

7.4.23 Five confirmed building roosts will be lost within the land required for construction of the Proposed Scheme due to the demolition of buildings at a farm near Hints. The five buildings were found to support small numbers of Natterer's bat. The loss of this collection of roosts will have an adverse effect on the population of Natterer's bat, which will be significant at a county/metropolitan level.

7.4.24 One tree roost lies within land required for the construction of the Proposed Scheme along a hedgerow north of Cranebrook Hill Road. The tree roost has potential to support individuals of rarer bat species which have been confirmed using habitats close by. The loss of roosts which may support individuals of rarer bat species would have an adverse effect on the conservation status of rarer bat species that would be significant up county/metropolitan level.

7.4.25 Woodland habitat that is to be lost at Rookery, Roundhill Wood and Job's Hill Plantation provides roosting opportunities. Within Roundhill Wood, no known tree roosts will be lost. Some trees with moderate potential to be used by roosting bats will be lost, including some within Roundhill Wood, but these are limited in number so the loss of roosting opportunities will be limited. The localised loss of roosting opportunities will lead to an adverse effect on the conservation status of the assemblage of bats concerned that will be significant at a district/borough level.

7.4.26 Woodland habitat is to be lost at Rookery, Roundhill Wood and Job's Hill Plantation used by the assemblage of bats recorded between the A5 and the A543 including: common pipistrelle, soprano pipistrelle, brown long-eared, *Myotis* species and noctule. The Proposed Scheme will result in the permanent loss and severance of key commuting routes along woodland edge and hedgerows but connectivity along the Black-Bourne Brook will be retained. The impacts on areas of key foraging and key commuting habitat would be localised. The combination of these impacts will lead to an adverse effect on the conservation status of the assemblage of bats concerned that will be significant at a district/borough level.

7.4.27 Habitats bound by the A5 and the A51 Tamworth Road, centred on Packington Moor, are used by a diverse assemblage of bats including: common pipistrelle, soprano pipistrelle, brown long-eared bats, *Myotis* species, noctule and Nathusius' pipistrelle. No confirmed tree roosts would be lost. A low density of trees with high and moderate bat roost potential along hedgerows are within land required for construction of the Proposed Scheme although loss of roosting opportunities will be limited. The Proposed Scheme will result in the permanent loss and severance of hedgerows, including those associated with Tamworth Lane and Knox's Grave Lane, a key commuting feature found to support low levels of commuting activity by the rare bat species Nathusius' pipistrelle. These impacts may deter bats from using the habitats and move bat populations away from preferred commuting and foraging habitats including Moor Covert, found to support activity by common pipistrelle, soprano pipistrelle and *Myotis* species. The impacts on areas of key commuting and key foraging habitat would be localised. These impacts will lead to an adverse effect on the conservation status on the assemblage of bats concerned that would be significant at up to a district/borough level.

7.4.28 Habitats bound by the A453 Sutton Road and Drayton Lane within land required for the construction of the Proposed Scheme, are used by a diverse assemblage of bats including: common pipistrelle, soprano pipistrelle, *Myotis* species, noctule and Leisler's. No confirmed tree roosts would be lost. There is a low density of trees with high and moderate potential along hedgerows within land required for construction of the Proposed Scheme and loss of roosting opportunities will be limited. The Proposed Scheme will result in the permanent loss and severance of hedgerows, which have been identified as key commuting and foraging features. These impacts may deter bats from using the habitats and move bat populations away from commuting and foraging habitats. The impacts on areas of key commuting habitat would be localised. These impacts will lead to a temporary adverse effect on the conservation status of the assemblage of bats concerned that would be significant at a district/borough level.

7.4.29 Habitats within land required for the construction of the Proposed Scheme south-west of Drayton Bassett are used by a diverse assemblage of bats including common pipistrelle, soprano pipistrelle, brown long-eared bats, *Myotis* species, noctule, Leisler's and Nathusius' pipistrelle. In this area, no confirmed tree bat roosts or trees with high or moderate potential to support roosting bats will be removed. Key foraging and commuting habitats will be severed or lost including water bodies (Marl Pit) and adjacent hedgerows. The installation of a culvert along Gallows Brook may move bat populations away from key foraging and key commuting habitat along this watercourse. The culvert on Gallows Brook will retain connectivity for *Myotis* species

along the watercourse. Other species recorded along the Brook, including common and soprano pipistrelles and noctule are less likely to use the culvert but may navigate over the route of the Proposed Scheme. The losses of foraging habitat will be localised. These impacts will lead to an adverse effect on conservation status of the assemblage of bats concerned that will be significant at a district/borough level.

7.4.30 There are four assumed great crested newt metapopulations present within the Drayton Bassett, Hints and Weeford area: AMP25, 26, 27 and 28. At AMP26, all five ponds and approximately two thirds of the available terrestrial habitat will be lost. The terrestrial habitat loss will include woodland and hedgerows which could be used for foraging, refuge and hibernation. At AMP28, south of the A5, east of Weeford, both water bodies and approximately two thirds of the available terrestrial habitat will be lost. The terrestrial habitat loss will include grassland, which could be used for foraging. The Proposed Scheme will result in permanent adverse effects on the conservation status of the amphibian populations within AMP26 and AMP28 that, in each case, will be significant at the county/metropolitan level.

7.4.31 No ponds will be lost from AMP25 (south-west of Drayton Bassett) or from AMP27 (south-east of the A453 Sutton Road) and no significant effects are predicted.

7.4.32 There will be loss of a further 12 water bodies outside of great crested newt metapopulations. Amphibian surveys have been carried out on six of these water bodies; none of these water bodies were found to support great crested newt. Should amphibians be present within the six water bodies where no survey was possible, the Proposed Scheme could result in an adverse effect on the conservation status of amphibian populations which would, in each case, be significant at up to a county/metropolitan level.

7.4.33 The two potential barn owl nest sites south-east of Lichfield lie at the edge of, and within, the land required for construction of the Proposed Scheme respectively. One potential nest site is likely to be destroyed and the barn owls are likely to be displaced from both. Loss of these barn owl territories will result in an adverse effect on the conservation status of barn owl which will be significant at a county/metropolitan level.

7.4.34 There are no impacts on the unnamed water body associated with the Black-Bourne Brook at Hints where evidence of water voles has been recorded, although there may be a temporary disturbance of water vole using this water body during construction. Similarly there may be disturbance to water vole populations associated with this water body when using the Black-Bourne Brook as a commuting corridor. It is not expected that these impacts will result in a significant effect on the conservation status of water vole.

7.4.35 The permanent loss of woodlands within the Drayton Bassett, Hints and Weeford area will include partial loss of Roundhill Wood. This could result in an adverse effect on the conservation status of the invertebrate assemblage at Roundhill Wood that would be significant at a district/borough level.

7.4.36 It is considered unlikely that any other effects on species receptors at more than the local/parish level will occur. Effects at the local/parish level are listed in Volume 5: Appendix EC-005-003.

## Other mitigation measures

7.4.37 This section describes and assesses additional measures designed to reduce or compensate for significant ecological effects. These include habitat creation, habitat enhancement, and green bridges.

7.4.38 A number of specific ecological compensation areas are proposed along the route of the Proposed Scheme in order to deliver compensation for loss of habitats. These areas will include native habitats and species appropriate to the local area. By creating large-scale compensation areas, multiple complex habitats can be created with links to the surrounding landscape and will benefit species groups such as amphibians, birds, water voles, otters, reptiles and bats. There are five main ecological compensation areas in the Drayton Bassett, Hints and Weeford area:

- creation of a mosaic of grassland, scrub and ponds within a bend of Gallows Brook close to the southern boundary of the area (3.1ha);
- woodland creation areas near Hints to the west of the route of the proposed Scheme (14.6ha);
- grassland creation areas near Hints to the east of the route of the Proposed Scheme (5.5ha);
- an area of replacement ponds and terrestrial habitat for amphibians and replacement bat roost features east of the Proposed Scheme between the A453 Sutton Road and Drayton Lane overbridges (6.4ha); and
- a heathland creation area near Whittington (19.9ha).

7.4.39 Ancient woodland is irreplaceable. The loss of ancient woodland within the Rookery and Roundhill Wood will result in a significant adverse effect at a county/metropolitan level. However, this loss of woodland will be compensated through a range of measures. Ancient woodland soil with its associated seed bank will be salvaged and translocated to a receptor site that forms part of a series of woodland creation areas linking ancient and secondary woodlands west of Hints. This will increase the connectivity of fragmented ancient woodland parcels. Other measures such as planting native tree and shrub species of local provenance, and translocation of coppice stools and dead wood, will be undertaken as appropriate.

7.4.40 Woodland planting will be provided adjacent to the retained section of Rookery SBI and Roundhill Wood SBI to the west of the Proposed Scheme between Roundhill Wood underpass and the Black Brook viaduct. Woodland creation in this area will help to create better links between the Rookery SBI and Job's Hill Plantation. It will also increase the amount of woodland adjacent to Rough Leasow SBI. The total area of woodland planting will be 14.6ha. This does not include the additional tree and scrub planting that will be undertaken as part of the landscape design. The target habitat type for woodland compensation areas will be the habitat of principal importance lowland mixed deciduous woodland. Although it would take 50 years or more for this planting to mature, following establishment of woodland compensation measures impacts on woodland habitat will result in a beneficial effect on the conservation of woodland that would be significant at a county/metropolitan level.

7.4.41 Waggoner's Lane (Hedge 1) SBI will be translocated together with some of the standard trees to a landscape planting area immediately south of Bangley Lane and west of the route of the Proposed Scheme, contiguous with the retained part of the hedgerow; approximately 400m of hedgerow will be translocated. Established methods and best practice will be followed and suitable management will be used in order to conserve its woody species composition. Following translocation the structure and woody species composition will be retained so that the residual impact will be reduced to a level which will not result in a significant effect.

7.4.42 New hedgerow creation will be undertaken and connected habitat is provided within the landscape scheme to compensate for losses of wildlife corridors that hedgerows provide. There will be temporary adverse effects whilst the new hedges become established and mature. Following establishment and maturation of planting it is anticipated that any adverse impacts on hedgerows and the wildlife corridors they create will be reduced to a level which will not result in any significant effect on the conservation status of the habitat.

7.4.43 A total of 14ha of grassland will be created within the ecological compensation areas. To the east of the route of the Proposed Scheme in the Hints area between Roundhill Wood and the Black Brook, compensation will focus on 4ha of species-rich grassland creation to replace that lost within the wet meadows at Hints during construction. The target habitat will be marshy grassland that would be classified as 'coastal and floodplain grazing marsh' habitat of principal importance. Establishment of the new grassland to qualify as a habitat of principal importance is expected to take around 10 years. Assuming that the grassland will be managed as pasture land similar to the habitat that is being lost, it is expected that any adverse impacts on grassland during the construction of the Proposed Scheme will be reduced to a level at which they will not result in any significant effect on the conservation status of the habitat.

7.4.44 Compensatory habitat to address impacts on great crested newt and common amphibian populations in the area will be provided within the aforementioned ecological compensation areas, particularly within the area between the A453 Sutton Road and Drayton Lane overbridges, in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2). This will include the provision of replacement ponds, terrestrial habitat and hibernation habitat sufficient to maintain the favourable conservation status of the population affected.

7.4.45 Habitat enhancements will be undertaken in the Black Brook adjacent to the Black Brook viaduct. Where watercourses will be diverted to reduce the length of culvert required the realigned watercourse will incorporate measures that enhance watercourse habitat quality and to maintain habitat connectivity for otters, water voles and aquatic species.

7.4.46 A free-standing, purpose-built bat house will be provided south of Hints, adjacent to Black Brook and associated woodland habitats to mitigate for loss of the Natterer's roosts at Buck's Head Farm. To replace potential roosts within felled trees bat boxes will be installed within retained sections of woodland around Hints, in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2).

7.4.47 Severance of habitats used by commuting bats during construction will be addressed by measures in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2). Habitat creation in the ecological compensation areas will provide new foraging and commuting habitat for bats. A green bridge to reduce the effect of habitat severance for bats will be provided at the Hints Footpath 14 green overbridge and at Horsley Brook Farm green overbridge. Connectivity will also be maintained under the Proposed Scheme due to the presence of the Drayton Basset viaduct, Hints Footpath 9 underpass, Brockhurst Lane underbridge, and the Black Brook viaduct. In addition, planting leading up to the structures will encourage bats to use the overbridges and underpasses and the reinstatement of planting removed during temporary works will reduce the effect of habitat severance on bat populations.

7.4.48 Following the implementation of the measures proposed it is anticipated that any adverse impacts on bats during the construction of the Proposed Scheme will be reduced to a level at which they will not result in any significant effect on the conservation status of the species concerned.

7.4.49 Woodland, grassland and heathland creation in the ecological compensation areas will provide new habitat for reptiles and invertebrates. The provision of species-rich grassland will benefit open grassland nesting species, such as corn bunting, lapwing and skylark. In addition, creation of grassland on the cutting and embankment slopes of the Proposed Scheme will benefit reptiles and invertebrates by providing foraging and basking habitat.

7.4.50 A heathland/acid grassland creation area of 19ha has been identified near the A51 Tamworth Road to replace and translocate habitat otherwise lost within Whittington Heath Golf Course LWS (which is located within the Whittington to Handsacre area (CFA22)). This will include translocation of turves and/or topsoil of affected heathland and grassland. Receptor sites for amphibians and reptiles through habitat creation such as ponds will also be provided within the same area, in addition to features beneficial to terrestrial invertebrates. This habitat creation may benefit heathland and open grass nesting birds, such as linnet, corn bunting, lapwing and skylark.

7.4.51 A hobby nest site will be lost, but hobbies will colonise new nest sites. An artificial hobby nest will be provided within retained trees at the edge of the land required for the construction of the Proposed Scheme to mitigate for the loss of a nest site.

7.4.52 There will be an adverse effect on the conservation status of barn owls significant at the county/metropolitan level due to loss of two territories. To offset the likely loss of barn owls from the vicinity of the Proposed Scheme, opportunities to provide barn owl nesting boxes in areas greater than 1.5km from the route will be explored with local landowners. As the availability of nesting sites is a limiting factor for this species, the implementation of these measures would be likely to increase numbers of barn owls within the wider landscape and thus offset the adverse effect.

7.4.53 Mitigation measures to address the potential killing, injury and disturbance of badgers will be provided in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2). This will include the provision of badger-proof fencing and replacement setts where necessary. New

planting within the ecological mitigation areas will benefit badgers present in those areas by improving foraging habitat and providing new opportunities for sett creation.

7.4.54 The loss of the Staffordshire uncommon plants from ponds and from Hints Meadow West adjacent to Job's Hill would be mitigated through the collection of plants and of seeds for dispersal within the ecological compensation areas or other retained areas in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2). Following the implementation of the measures proposed it is anticipated that any adverse impacts on pond habitat and notable plants during the construction of the Proposed Scheme will be reduced to a level at which they will not result in any significant effect on the conservation status of the habitat and species concerned.

### Summary of likely residual significant effects

7.4.55 The mitigation, compensation and enhancement measures described above reduce the effects to a level that is not significant except for ancient woodlands in the Rookery and Roundhill Wood, and two barn owl territories.

7.4.56 There will be a permanent adverse effect on the ancient woodland within Rookery SBI due to the loss of 1.3 ha within this site. There will be a permanent adverse effect on the ancient woodland within Roundhill Wood SBI due to the loss of 2.0 ha within this site.

7.4.57 Due to the amount of woodland provided as compensatory habitat and the fact that it will increase linkages between existing woodlands, there will be a separate significant beneficial effect on woodland habitat.

7.4.58 The permanent loss of two barn owl territories represents a residual significant effect. However, if the proposed mitigation measures for barn owls are implemented through liaison with landowners, the residual effect on barn owls would be reduced to a level that is not significant.

## 7.5 Effects arising from operation

### Avoidance and mitigation measures

7.5.1 The following measures have been included as part of the design of the Proposed Scheme and avoid or reduce impacts on features of ecological value:

- Connectivity will be maintained for wildlife including bats and aquatic species due to the presence of the Drayton Basset Viaduct, Hints Footpath 9 underpass, Brockhurst Lane underbridge, Hints Footpath 14 green overbridge, the Black Brook viaduct; and Horsley Brook Farm green overbridge. In addition planting will encourage bats to use the overbridges and underpasses to cross beneath the Proposed Scheme;
- The placement of the route within the Drayton Lane cutting, the Hints cutting and the Swinfen cutting, and the false cutting west of Lower Bangley (Hints embankment) and at Hints (Milditch Wood embankment) will reduce the risk of bat species colliding with trains at those locations; and

- Within cuttings, the absence of woody species being planted along the slopes of the cutting will result in a low density of bat species using the slopes for foraging and commuting thus further reducing the risk of collision.

## Assessment of impacts and effects

7.5.2 The operation of the Proposed Scheme has the potential to result in a variety of impacts on bat populations including those as a result of collision with passing trains, turbulence and noise. The point at which such impacts are considered to result in a significant adverse effect on the conservation status of the population concerned will differ between species. As a consequence the following assessment of operational impacts takes into account the differing character and nature of the bat populations and/or assemblages concerned in determining the likely effects of the Proposed Scheme on each of these receptors.

7.5.3 Noise, vibration and lighting from passing trains have the potential to disturb bat species foraging and commuting within habitats close to the Proposed Scheme. Understanding of the impact of noise on bats caused by passing trains is limited. There is some evidence to suggest that gleaning bats, such as brown long-eared, will have reduced foraging success within areas where there is persistent noise from busy roads. However, noise generated from passing trains will be regular but temporary and as such will differ from that resulting from a busy road.

7.5.4 Due to the large areas over which bats forage it is likely that any loss of, or displacement from, suitable foraging habitat in the vicinity of the Proposed Scheme would in itself amount to only a small proportion of the wider available resource. However, the impact of any such disturbance or displacement could be greatly increased if bats are hampered in moving between breeding sites, hibernation sites and other roosts which they commonly utilise.

7.5.5 Where the route of the Proposed Scheme bisects, or is located in close proximity to, existing features known to be utilised regularly by foraging or commuting bats, there is an increased risk that bats could be killed or injured as a result of collisions with passing trains or associated turbulence. The significance of any such effect will be dependent on both the flight habitat of the species or species concerned and the vertical alignment of the Proposed Scheme (i.e. is the railway in cutting, on embankment, on a viaduct, or at grade) at the point the impact occurs.

7.5.6 The following species have been identified within the area through surveys and desk study that could be particularly at risk of collision with trains: whiskered, Natterer's, noctule, pipistrelle, and brown long-eared bat. The mitigation measures that are included within the Proposed Scheme to reduce the impacts of habitat severance during construction will act to reduce the risk of collisions of bats with trains.

7.5.7 One viaduct within the Drayton and Bassett area will cross habitats used by foraging and commuting bats. Bats may fly across the route of the Proposed Scheme at the Black-Bourne Brook and through the area around the hilltop woodlands at Hints. Most bat species will fly underneath structures by following the watercourse under them whilst the higher flying noctule, Leisler's and serotine are likely to navigate over the structures. Although there is a risk of individual bats being killed or injured by collision

with trains, the risks are considered to be minimal and are unlikely to result in significant effects on the conservation status of any of the bat species concerned.

7.5.8 The noise made by passing trains has the potential to disturb birds within habitats close to the Proposed Scheme. Birds habituate to loud noises that they hear regularly and frequently, and hence it is considered that this will not generally cause significant effects. There is some evidence to suggest that breeding bird densities can be reduced where there is persistent noise from busy roads due to birds being unable to hear each other's songs. However, this is not expected to occur with the Proposed Scheme as trains will pass quickly. The effect of train noise on breeding birds is therefore not considered to be significant.

7.5.9 It is considered unlikely that any effects at more than the local/parish level will occur. Effects at the local/parish level are listed in Volume 5: Appendix EC-005-003.

## Other mitigation measures

7.5.10 Additional elements designed to reduce or compensate for significant ecological effects are not required in this area.

## Summary of likely residual significant effects

7.5.11 The mitigation, compensation and enhancement measures described above will reduce the effects to a level that is not significant.

# 8 Land quality

## 8.1 Introduction

8.1.1 This section presents the baseline conditions that exist along the Proposed Scheme in relation to land quality and reports the likely impacts and any significant effects resulting from construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, mining or mineral resources point of view, including: geological sites of special scientific interest (SSSI), local geological sites (LGS), areas of current underground or opencast mining and areas of designated mineral resources. Mitigation measures are presented and any residual effects are summarised.

8.1.2 Potentially contaminated areas of land have been identified that could affect, or be affected by, the construction of the Proposed Scheme (for example contaminated soils may need to be removed or the construction may alter existing contamination pathways). Each of these areas has been studied to evaluate the scale of potential impacts caused by existing contamination (if present) and what needs to be done to avoid significant consequences to people and the wider environment. In addition, a review has been undertaken to establish whether the operation of the Proposed Scheme will lead to contamination of its surrounding environment and what needs to be done to prevent such contamination.

8.1.3 The main environmental features of this area include Gallows Brook, Bourne Brook, Black Brook and widespread areas of bedrock-derived sand and gravel which represent an identified mineral resource.

8.1.4 The main land quality issues in this area include:

- several farmsteads located on the route of the Proposed Scheme; and
- a Mineral Safeguarding Area (MSA) for sand and gravel, located at the southern extent of the study area and two Mineral Consultation Areas[34] (MCA) for sand and gravel – one located immediately north of Black Brook and one located between Horsley Brook Farm and the A51 Tamworth Road.

8.1.5 Details of baseline information and the land quality assessment methodology are outlined in the following appendices (presented in Volume 5):

- Appendix CT-001-000/1: the SMR and Appendix CT-001-000/2 the SMR Addendum; and
- Appendix LQ-001-021: Land quality appendix.

8.1.6 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 13, Water

[34] Mineral Consultation Areas (MCA) are provided by some county councils to ensure that in two-tier authority areas consultation takes place between county and district planning authorities when mineral interests could be compromised by proposed non-minerals development. MCA also give an additional measure of safeguarding to sites related to minerals infrastructure, such as wharves and railway sidings, that cannot be protected by MSA. British Geological Survey (2007), Report CR/07/060/A guide to mineral safeguarding in England.

resources and flood risk assessment. Issues regarding the disposal of waste materials, including contaminated soils, are addressed in Volume 3 Section 14.

8.1.7 Engagement has been undertaken with Lichfield District Council (LDC) and the EA regarding contaminated land and with Staffordshire County Council (SCC) regarding mineral resources. Furthermore, the Ministry of Defence (MoD) has been consulted regarding Defence Medical Services (DMS) Whittington and the military land at Whittington.

## 8.2 Scope, assumptions and limitations

8.2.1 The assessment scope, key assumptions and limitations for the land quality assessment are set out in Volume 1 and in the SMR and its addendum presented in Volume 5: Appendices CT-001-000/1 andCT-001-000/2. This section follows the standard assessment methodology.

8.2.2 Baseline data were reviewed for the area of land required to construct the Proposed Scheme excluding areas of utility diversion works in existing highways together with a buffer extending out for a minimum of 250m, but in the case of groundwater data up to 1km. This is defined as the study area.

8.2.3 Areas of utility diversion works in existing highways have been excluded because with respect to land quality issues, utility works within the highway are a low-risk construction activity, as most of the excavation works will be within the highway construction layers, and reinstatement will be undertaken with highway construction materials.

8.2.4 Familiarisation visits to the study area were made in October 2012 where the location of the Proposed Scheme was viewed from points of public access only. Due to access constraints not all sites considered to have the greatest potential for contamination were visited. However, the purpose of site visits is to verify desktop information and the lack of complete site walkovers is considered unlikely to have substantially affected the land quality assessment.

## 8.3 Environmental baseline

### Existing baseline

8.3.1 Unless otherwise stated, all features described in this section are presented in Volume 5: Map Book – Land quality, Maps LQ-01-059 to LQ-01-061a.

#### *Geology*

8.3.2 This section describes the underlying ground conditions within the study area. It first describes any made ground present, followed by near surface superficial deposits and lastly describes the deeper bedrock geology. The geological mapping is illustrated on Volume 5: Map Book – Water resources and flood risk assessment, Map WR-02-21.

8.3.3 British Geological Survey (BGS) mapping indicates the presence of made ground in the locations of infilled pits and infilled ponds at the southern extent of the study area. Although not shown on geological mapping, there are likely to be other areas of made ground associated with highways and roads which will be intersected by the Proposed Scheme.

8.3.4 There are no landfills located in the study area.

8.3.5 The superficial deposits are sparse along the Proposed Scheme. River Alluvium, comprising clay, silt, sand and gravel, is located south of Oak Dairy Farm and is associated with an area of floodplain at Gallows Brook. River Alluvium is also located on the floodplain of Black Brook.

8.3.6 Superficial deposits of glacial till are located in two areas along the Proposed Scheme, between Shirrall Hall Farm and the A453 Sutton Road and in an isolated pocket at DMS Whittington.

8.3.7 The Mercia Mudstone Group underlies the Proposed Scheme almost as far north as Roundhill Wood and is described as red and green-grey mudstones and subordinate siltstones with widespread thin beds of gypsum and anhydrite. Sandstones, mudstones and conglomerate of the Enville Member underlie the Proposed Scheme between Roundhill Wood and Black Brook with intermittent outcrops of the Hopwas Breccia Formation, described as interbedded breccia and sandstone. The underlying bedrock north of Black Brook to the end of the study area comprises sandstones and conglomerate of the Kidderminster Formation and pebbly sandstones of the Bromsgrove Sandstone Formation.

### *Groundwater*

8.3.8 There are four categories of aquifer identified within the study area. The Hopwas Breccia Formation, Kidderminster Formation and Bromsgrove Sandstone Formation are all classified as Principal aquifers. The Enville Member is classified as a Secondary A aquifer and the Mercia Mudstone Group underlying the southern part of the Proposed Scheme is classified as a Secondary B aquifer.

8.3.9 Where present, River Alluvium is classified as a Secondary A aquifer and the glacial till is classified as Unproductive strata.

8.3.10 The northern extent of the Proposed Scheme, from Black Brook to the north of this study area, lies within a Total Catchment Source Protection Zone (SPZ) 3. The SPZ3 relates to a public water supply borehole abstracting from the Bromsgrove Sandstone Formation in Whittington to Handsacre (CFA22) to the north.

8.3.11 There is one current, licensed groundwater abstraction within the study area, relating to use in general agriculture. A further four licensed groundwater abstractions are located within 1km of the land required for the construction of the Proposed Scheme.

8.3.12 Further detail on the groundwater beneath the Proposed Scheme can be found in Section 13, Water resources and flood risk assessment.

### *Surface waters*

8.3.13 Gallows Brook marks the southern extent of this part of the Proposed Scheme and Black Brook will be intersected by the Proposed Scheme at the approximate mid-point of the study area.

8.3.14 The Proposed Scheme will cross an unnamed tributary approximately 370m to the south of Oak Dairy Farm and a tributary of the Bourne Brook approximately 260m to the north-west of White House Farm.

8.3.15 One spring will be crossed by the Proposed Scheme. The spring will be intersected twice by the Proposed Scheme approximately 120m to the south of Roundhill Wood. There are also several ponds present in the study area.

8.3.16 There are eight locations where surface water is abstracted within 1km of the Proposed Scheme.

8.3.17 Further information on surface waters is provided in Section 13, Water resources and flood risk assessment.

### *Current and historical land use*

8.3.18 All potentially contaminated sites, identified from both current and historical land uses, are shown on Volume 5: Map Book – Land quality, Maps LQ-01-059 to LQ-01-061a. Each potentially contaminative land use is annotated on the maps using the code 21-XX, where 21 denotes the CFA number and XX denotes the individual site reference.

8.3.19 Current potentially contaminative land uses include a number of farmsteads located within the study area, a gas valve compound and a garage off the A51 Tamworth Road. Farmsteads have been included as a potential source of contamination because they may store and use fuels, oils and pesticides.

8.3.20 The principal historical potentially contaminative land uses are a number of former tanks and a sheep dip, all located at farmsteads along the Proposed Scheme. Historical maps indicate the presence of tanks at Draytonlane End Farm (Map LQ-01-059, E7), White House Farm (Map LQ-01-059, B7) and Buck's Head Farm (Map LQ-01-060, C7). The sheep dip was located at Packington Moor farmstead (Map LQ-01-061a, F6).

8.3.21 Other historical land uses identified within the study area with the potential to have caused contamination include infilled pits, infilled ponds and infilled domestic water wells. The pits, ponds and domestic water wells may have been manually infilled with a variety of waste materials and could also give rise to landfill gases such as methane, carbon dioxide and volatile organic compounds (VOC).

8.3.22 DMS Whittington (Map LQ-01-061a, C4) and Whittington Heath (Map LQ-01-061a, B6) are located immediately to the north of the Drayton Bassett, Hints and Weeford area (CFA21) within the Whittington to Handsacre area (CFA22). However, as the study area for Drayton Bassett, Hints and Weeford encroaches into this area, DMS Whittington and Whittington Heath are assessed in both areas.

### *Other regulatory data*

8.3.23 Regulatory data reviewed include pollution incidents, radioactive and hazardous substances consents and environmental permits (previously landfill, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) licences). None of the data reviewed in this study area are considered relevant to the land quality assessment.

### *Mining/mineral resources*

8.3.24 Staffordshire and Stoke-on-Trent Minerals Local Plan 1994-2006[35] contains policies that seek to safeguard mineral resources against sterilisation from development.

8.3.25 The study area is adjacent to Hints Quarry, an active sand and gravel quarry extending to the south-west of the village of Hopwas. However, the area of extraction lies outside the study area, with only the quarry access road lying adjacent to the area of land required to construct the Proposed Scheme.

8.3.26 There are no Preferred Areas (PA)[36] within the study area.

8.3.27 One sand and gravel MSA identified by Warwickshire County Council overlaps the boundary between Warwickshire and Staffordshire and will be intersected by the Proposed Scheme, located between Upper House Farm and Shirrall Hall Farm towards the southern boundary of the Drayton Bassett, Hints and Weeford area.

8.3.28 Two sand and gravel MCA related to the Kidderminster Formation will be intersected by the Proposed Scheme. One is located immediately to the north of Black Brook and the other is located between Horsley Brook Farm and the A51 Tamworth Road.

8.3.29 The mining/mineral resources are shown on Volume 5: Map Book – Land quality, Maps LQ-01-059 to LQ-01-061a.

### *Geo-conservation resources*

8.3.30 There are no geo-conservation resources identified within the study area.

### *Receptors*

8.3.31 The sensitive receptors that have been identified within this study area are summarised in Table 14.

Table 14: Summary of sensitive receptors

| Issue | Receptor type | Receptor description | Receptor sensitivity |
|---|---|---|---|
| Land contamination | People | Residents | High |
| | | Workers | Moderate |
| | Controlled waters | Principal aquifers | High |
| | | Secondary A aquifers | High |
| | | Secondary B aquifers | Moderate |
| | | Rivers | High |
| | | Other surface watercourses and water bodies | Moderate |
| | Built environment | Buildings and property | Low to high |
| | | Underground structures and services | Low |

[35] Staffordshire and Stoke-on-Trent Councils (1999), *Staffordshire and Stoke-on-Trent Minerals Local Plan 1994-2006*.
[36] Areas where mineral deposits are known to exist and where the County Council considers there would be least planning objection to mineral extraction taking place.

| Issue | Receptor type | Receptor description | Receptor sensitivity |
|---|---|---|---|
| | Mineral resources | Hints Quarry | Moderate |
| | | Sand and Gravel MSA | Moderate |
| | | Sand and Gravel MCA | Moderate |
| Impacts on mining/mineral sites (severance and sterilisation of mineral sites) | Mining/mineral sites | Hints Quarry | High |
| | | Sand and Gravel MSA | Moderate |
| | | Sand and Gravel MCA | Low |

### Future baseline

#### *Construction (2017)*

8.3.32 All committed development is described in Volume 5: Appendix CT-004-000. Committed development relevant to land quality includes changes to Horsley Brook Farm, Buck's Head Farm and Packington Moor Farm.

8.3.33 The proposed changes will not alter the overriding land use at each farm and, for this reason, the baseline conditions against which the construction assessment is undertaken remains unchanged.

#### *Operation (2026)*

8.3.34 Operation of the Proposed Scheme will not alter the overriding land use at each farm and, for this reason, the baseline conditions against which the operation assessment is undertaken remains unchanged.

## 8.4 Effects arising during construction

### Avoidance and mitigation measures

8.4.1 The construction assessment takes into account the mitigation measures contained within the draft Code of Construction Practice (CoCP) (see Volume 5: Appendix CT-003-000). The draft CoCP sets out the measures and standards of work that will be applied to the construction of the Proposed Scheme. Its requirements in relation to work in contaminated areas will ensure the effective management and control of the work. Such requirements include the following:

- methods to control noise, waste, dust, odour, gases and vapours;
- methods to control spillage and prevent contamination of adjacent areas;
- the management of human exposure for both construction workers and people living and working nearby;
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated);
- management of any unexpected contamination found during construction;
- a post remediation permit to work system; and
- storage requirements for hazardous substances such as oil.

8.4.2 The draft CoCP requires that a programme of further investigations, which may include both desk based and site based work, will take place in order to confirm the full extent of areas of contamination and a risk assessment undertaken to determine what, if any, site specific remediation measures will be required to allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants (draft CoCP, Section 11). The investigation and assessment of potentially contaminated sites will be undertaken in accordance with:

- Environment Agency CLR11 Model Procedures for the Management of Land Contamination (2004)[37]; and
- British Standard BS10175 Investigation of Potentially Contaminated Sites (2011)[38].

8.4.3 Where significant contamination is encountered, a remedial options appraisal will be undertaken to define the most appropriate remediation techniques. This appraisal will be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with Sustainable Remediation Forum UK's publication A Framework for Assessing the Sustainability of Soil and Groundwater Remediation (2010)[39]. The preferred option will then be developed into a remediation strategy, in consultation with regulatory authorities prior to implementation.

8.4.4 Contaminated soils excavated from the site, wherever feasible, will be treated as necessary to remove or render any contamination inactive and reused within the Proposed Scheme where needed and suitable for use. Treatment techniques are likely to include stabilisation methods, soil washing and bio-remediation to remove oil contaminants. Contaminated soil disposed of off-site will be taken to a soil treatment facility, another construction site (for treatment, as necessary, and re-use) or to an appropriately permitted landfill site.

## Assessment of impacts and effects

8.4.5 The majority of the Proposed Scheme through this area will require a cutting below existing ground levels. The main construction features of the Proposed Scheme will include two viaducts crossing Gallows Brook and Black Brook and overbridges at the A5 trunk road, Watling Street, Flats Lane/Jerry's Lane and the A51 Tamworth Road.

8.4.6 Construction works will include earthworks, utility diversions, deep foundations, temporary dewatering and other activities. In addition, road infrastructure works will also be required within this section of the Proposed Scheme.

8.4.7 Site compounds for the Drayton Bassett, Hints and Weeford area will be located at various points along the Proposed Scheme (see Section 2.3). The compounds will include maintenance facilities for plant and machinery and fuel storage in bunded tanks.

[37] Environment Agency (2004), *CLR11 Model Procedures for the Management of Land Contamination.*
[38] British Standard BS1017 (2011), *Investigation of Potentially Contaminated Sites.*
[39] Sustainable Remediation Forum UK (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation.*

### *Land contamination*

8.4.8 In line with the assessment methodology, as set out in the SMR and SMR Addendum, an initial screening process was undertaken (identified in the methodology as Stages A and B) to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. In total, 16 areas were considered during this screening process; seven of these areas were taken forward to more detailed risk assessments (Stages C and D), in which the potential risks were assessed more fully. The majority of the areas undergoing the more detailed risk assessments were farmsteads with associated former tanks and former sheep dips. All areas assessed are shown on Volume 5: Map Book – Land quality, Maps LQ-01-059 to LQ-01-061a and those considered as potentially posing a risk to the Proposed Scheme are labelled with a reference number.

8.4.9 Conceptual site models (CSM) have been produced for the seven areas taken to Stage C and D assessments. The detailed CSM are provided in Volume 5: Appendix LQ 001-021, Section 3 and the results of the baseline risk assessments are summarised in this section. Potentially contaminated areas have been grouped and considered together, where appropriate. The following factors have determined the need for Stage C and D assessments:

- whether the area is on or off the Proposed Scheme or associated offline works; e.g. roads;
- the vertical alignment, i.e. whether the Proposed Scheme is in cutting or on embankment;
- the presence of underlying Principal or Secondary A aquifers or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors.

8.4.10 The assessed baseline risk is based on the information provided at the time of the assessment. Where limited information is available, it is based on precautionary, worst case assumptions and may therefore report a higher risk than that which actually exists.

8.4.11 A summary of the baseline CSM is provided in Table 15. The impacts and baseline risks quoted are before any mitigation is applied.

Table 15: Summary of baseline CSM* for sites which may pose a contaminative risk for the Proposed Scheme

| Area ref.** | Area name | Main potential impacts | Main baseline risk |
|---|---|---|---|
| 21-02 (LQ-01-060, D6) | Infilled Pond | Potential impact to human health on-site and off-site, property receptors and groundwater. | Low |
| 21-10 (LQ-01-059, B7) | White House Farm with former tanks | Potential impact to human health on-site and off-site, groundwater and surface watercourses. | Low |
| 21-11 (LQ-01-060, C7) | Buck's Head Farm with former tanks | Potential impact on groundwater. | Low |
| 21-12 (LQ-01-061a, F6) | Packington Moor Farm with former sheep dip | Potential impact on groundwater. | Low |
| 21-14 (LQ-01-061a, C6) | Garage | Potential impact on groundwater. | Low |
| 21-15 (LQ-01-061a, B6) | Whittington Heath*** | Potential impact on groundwater. | Low |
| 21-16 (LQ-01-061a, C4) | DMS Whittington*** | Potential impact on groundwater. | Low |

*CSM have been prepared as part of the detailed land contamination methodology (refer to Volume 5) for baseline, construction and post-construction.
** Each area is assigned a unique identification number (see Volume 5: Appendix LQ-001-021).
*** These areas are immediately to the north of the northern boundary of the Drayton Bassett Hints and Weeford area but are included as they are within the 250m buffer forming the study area.

## Temporary effects

8.4.12 An assessment of the effects of contamination has been undertaken by comparing the CSM developed for potential contaminated areas at baseline, construction and post construction stages. The baseline and construction CSM have been compared to assess effects at the construction stage.

8.4.13 Table 16 presents the summary of the construction effects obtained from a comparison of the baseline and construction impacts. The construction risk assessment takes into account the implementation of the mitigation measures set out within the draft CoCP. The details of these comparisons are presented in Volume 5: Appendix LQ 001-021.

8.4.14 The baseline and construction CSM have been compared to determine the change in level of risk to receptors during the construction stage, and thus to define the level of effect at the construction stage. Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible even if the risk is assessed to remain as high. This will be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the land required for construction of the Proposed Scheme.

Table 16: Summary of temporary (construction) effects

| Area reference | Area name | Main baseline risk | Main construction risk | Temporary effect and significance |
|---|---|---|---|---|
| 21-02 (LQ-01-060, D6) | Infilled Pond | Low | Low | Negligible (not significant) |
| 21-10 (LQ-01-059, B7) | White House Farm with former tanks | Low | Moderate/low (groundwater) | Minor adverse (not significant) |
| 21-11 (LQ-01-060, C7) | Buck's Head Farm with former tanks | Low | Moderate/low (groundwater) | Minor adverse (not significant) |
| 21-12 (LQ-01-061a, F6) | Packington Moor Farm with former sheep dip | Low | Moderate/low (groundwater) | Minor adverse (not significant) |
| 21-14 (LQ-01-061a, C6) | Garage | Low | Moderate/low (groundwater) | Minor adverse (not significant) |
| 21-15 (LQ-01-061a, B6) | Whittington Heath | Low | Moderate/low (groundwater) | Minor adverse (not significant) |
| 21-16 (LQ-01-061a, C4) | DMS Whittington | Low | Low | Negligible (not significant) |

8.4.15 Table 16 indicates that based upon the assessment, no significant effects have been identified during the construction phase in relation to potential land contamination. However, risks to groundwater within the Principal aquifer have been identified, particularly where areas are intersected by the Proposed Scheme such as the farms and the garage.

8.4.16 These risks relate to the potential for temporary mobilisation of contaminants during construction allowing an increase in migration of contaminants to groundwater. The risks are assessed as temporary minor adverse effects.

8.4.17 Construction compounds located in this study area will include staff welfare facilities, maintenance facilities for plant and machinery and fuel storage in bunded tanks. Construction compounds will store and use potentially contaminative materials such as fuels, oils and solvents, and the measures outlined in the draft CoCP will manage risks from the storage of such materials.

8.4.18 The main and satellite compounds may also be used for temporary storage of potentially contaminated soils. The measures outlined in the draft CoCP will manage risks from the storage of such materials. The location of these construction compounds can be found in Section 2.3.

8.4.19 It is considered unlikely that additional remediation works will be required over and above the mitigation measures contained as standard within the draft CoCP.

8.4.20 There are anticipated to be no significant cumulative effects from construction.

### *Permanent effects*

8.4.21 Baseline and post-construction CSM have been compared to assess the permanent (post-construction) effects. The post-construction CSM assumes that all the required remediation has been carried out and validated.

8.4.22 Table 17 includes the summary of the permanent effects obtained from a comparison of the baseline and post-construction impacts and whether or not these are significant. The details of these comparisons are presented in Volume 5: Appendix LQ-001-021.

Table 17: Summary of permanent (post-construction) effects

| Area reference | Area name | Main baseline risk | Main post-construction risk | Post-construction effect and significance |
|---|---|---|---|---|
| 21-02 (LQ-01-060, D6) | Infilled Pond | Low | Low | Negligible (not significant) |
| 21-10 (LQ-01-059, B7) | White House Farm with former tanks | Low | Low | Negligible (not significant) |
| 21-11 (LQ-01-060, C7) | Buck's Head Farm with former tanks | Low | Very Low | Minor beneficial (not significant) |
| 21-12 (LQ-01-061a, F6) | Packington Moor Farm with former sheep dip | Low | Very Low | Minor beneficial (not significant) |
| 21-14 (LQ-01-061a, C6) | Garage | Low | Very Low | Minor beneficial (not significant) |
| 21-15 (LQ-01-061a, B6) | Whittington Heath | Low | Low | Negligible (not significant) |
| 21-16 (LQ-01-061a, C4) | DMS Whittington | Low | Low | Negligible (not significant) |

8.4.23 The magnitude of the permanent effects and their significance have been determined by calculating the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance is deemed to be negligible even if the risk is assessed to remain as high. This will be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the land required for construction of the Proposed Scheme.

8.4.24 Table 17 indicates that following remediation, there will be overall negligible to minor beneficial effects. Depending on the type of remediation undertaken, the beneficial effect could include an improvement in groundwater quality, the breaking of a ground gas migration pathway or the reduction in the volume of contaminants present in the soil.

8.4.25 An example would be the garage, which will be demolished during the construction phase of the Proposed Scheme and any contamination encountered during construction relating to the garage will be removed or remediated. This will result in a reduction in the effects of contaminants present in the soil. Similar beneficial effects are anticipated at Buck's Head Farm and Packington Moor Farm, both of which will be intersected by the Proposed Scheme.

8.4.26 There are anticipated to be no significant cumulative permanent effects.

## Mining/mineral resources

8.4.27 Construction of the Proposed Scheme has the potential to impact existing mineral resources and proposed areas of mineral exploitation. This could occur by sterilisation of the resource, direct excavation during construction of the Proposed Scheme or through temporary and/or permanent severance[40] that may occur during the construction phase of the Proposed Scheme, possibly continuing through to operation.

### *Temporary effects*

8.4.28 Temporary adverse effects are anticipated on MSA and MCA which will be temporarily used for construction and returned to use.

8.4.29 Table 18 presents a summary of the assessment of temporary effects on the mining and mineral resources identified. Satellite construction compounds cover a very small area of the MSA for a temporary period and the magnitude of impact is assessed as minor.

Table 18: Summary of temporary effects for mining and mineral resources

| Site name | Status | Description | Sensitivity/ value | Magnitude of impact | Effect and significance |
|---|---|---|---|---|---|
| Hints Quarry LQ-01-60 | Active quarry | Sand and gravel quarry | High | Negligible (outside area required to construct the Proposed Scheme) | Negligible (not significant) |
| Area at the southern extent of study area LQ-01-59 | Mineral safeguarding area | Mineral safeguarding area for sand and gravel extraction | Moderate | Minor | Negligible (not significant) |
| Area of land north of Black Brook LQ-01-60 | Mineral consultation area | Mineral consultation area for sand and gravel extraction | Low | Minor | Negligible (not significant) |
| Land between Horsley Brook Farm and A51 LQ-01-61 | Mineral consultation area | Mineral consultation area for sand and gravel extraction | Low | Minor | Negligible (not significant) |

8.4.30 No significant temporary effects are anticipated on the existing mineral resource.

8.4.31 There are anticipated to be no significant cumulative effects from construction on the mineral resource.

### *Permanent effects*

8.4.32 Construction of the Proposed Scheme will affect existing mineral resources within the sand and gravel MSA and both sand and gravel MCA. Potential minor adverse effects are anticipated at both MCA. The effect is assessed as not significant because there will be sterilisation or isolation of a small area of a large local reserve. It is possible that mineral extraction could be undertaken in advance of, or during, construction of the Proposed Scheme through the MSA and MCA.

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

8.4.33 A negligible impact is anticipated at Hints Quarry because the area of extraction lies outside the study area, and this will result in a negligible effect.

8.4.34 Table 19 presents a summary of the assessment of effects on the mining and mineral resources identified.

Table 19: Summary of effects for mining and mineral resources

| Site name | Status | Description | Sensitivity/ value | Magnitude of impact | Effect and significance |
|---|---|---|---|---|---|
| Hints Quarry LQ-01-60 | Active quarry | Sand and gravel quarry | High | Negligible (outside area required to construct the Proposed Scheme) | Negligible (not significant) |
| Area at the southern extent of study area | Mineral safeguarding area | Mineral safeguarding area for sand and gravel extraction | Moderate | Moderate | Minor adverse (not significant) |
| Area of land north of Black Brook LQ-01-60 | Mineral consultation area | Mineral consultation area for sand and gravel extraction | Low | Moderate | Minor adverse (not significant) |
| Land between Horsley Brook Farm and A51 LQ-01-61 | Mineral consultation area | Mineral consultation area for sand and gravel extraction | Low | Moderate | Minor adverse (not significant) |

8.4.35 No significant effects are anticipated on the existing mineral resource.

8.4.36 There are anticipated to be no significant cumulative permanent effects from construction. The cumulative effects on mineral resources across the whole of the Proposed Scheme are discussed in route-wide effects presented in Volume 3: Section 15.

## Geo-conservation sites

8.4.37 No geo-conservation areas such as SSSI or LGS are present in the study area.

8.4.38 However, in the location of the Brockhurst Lane underbridge, the Enville Member will be exposed through construction and could provide an opportunity for academic study, which could be of interest to academic groups, geological institutions and local enthusiasts.

## Other mitigation measures

8.4.39 At this stage, no additional mitigation measures are considered necessary to mitigate risks from land contamination during the construction phase beyond those set out in the draft CoCP and instigated as part of required remediation strategies.

8.4.40 Mitigation of the effects on mineral resources can include prior extraction of the resource for use within the project or elsewhere. Extraction may be limited to landscaped areas within the Proposed Scheme adjacent to rather than beneath the trackbed, which will require good founding conditions. A plan will be discussed and agreed in advance of the construction works with the landowner, the mineral planning department at SCC and any other interested parties to assist in achieving an effective management of minerals within the affected location of the MSA and MCA.

### Summary of likely residual significant effects

8.4.41 No likely significant effects are anticipated with the application of the mitigation measures detailed above.

## 8.5 Effects arising from operation

8.5.1 Users of the Proposed Scheme (i.e. rail passengers), whilst within trains, will at all routine times be within a controlled environment and therefore have been scoped out of the assessment.

### Avoidance and mitigation measures

8.5.2 Maintenance and operation of the Proposed Scheme will be in accordance with environmental legislation and good practice whereby appropriate spillage and pollution response procedures will be established.

### Assessment of impacts and effects

8.5.3 There are two auto-transformer stations proposed to be located in the Drayton Bassett, Hints and Weeford area. The Drayton Lane auto-transformer station will be located to the east of the Proposed Scheme and to the south of Oak Dairy Farm. The Flats Lane auto-transformer station will be located east of Flats Lane, just to the west of the Proposed Scheme.

8.5.4 An auto-transformer station can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, the proposed auto-transformer stations, in common with other modern substations, will use secondary containment appropriate to the level of risk.

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

8.5.6 It is unlikely that there will be any cumulative effects on land quality receptors due to the environmental controls that will be placed on operational procedures.

### Other mitigation measures

8.5.7 No other mitigation measures will be required beyond what has already been outlined relating to land quality in the Drayton Bassett, Hints and Weeford area.

8.5.8 There may be ongoing monitoring requirements following remediation works carried out during construction. Such monitoring, including monitoring of groundwater quality or ground gas, could extend into the operational phase of the Proposed Scheme.

### Summary of likely residual significant effects

8.5.9 No residual significant effects are anticipated associated with operation of the Proposed Scheme.

# 9 Landscape and visual assessment

## 9.1 Introduction

9.1.1 This section reports the assessment of the likely significant landscape and visual effects. It starts by summarising the baseline and future conditions found within and around the route of the Proposed Scheme and goes on to describe the significant effects that will arise during construction and operation on landscape character areas (LCA) and visual receptors.

9.1.2 In this section, the operational assessment section refers not just to the running of the trains but also the presence of the new permanent infrastructure associated with the Proposed Scheme.

9.1.3 Principal landscape and visual issues in the area include:

- temporary effects to LCA and visual receptors during construction arising from the presence of construction plant, worksites, removal of existing vegetation and severance of agricultural land and construction of design elements of the Proposed Scheme; and
- permanent landscape and visual effects during operation arising from the presence of new engineered landforms cutting across the existing landscape, new viaducts, noise fence barriers, highway infrastructure, overhead line equipment and regular passing of high speed trains. In the main, permanent adverse effects will reduce over time as planting established as part of the Proposed Scheme matures.

9.1.4 A separate but related assessment of effects on the setting of heritage assets is included in Section 6, Cultural heritage. Further details on the landscape and visual assessment, including engagement, baseline information and assessment findings, are presented in Volume 5: Appendix LV-001-021, which comprises the following:

- Part 1 Engagement with technical stakeholders;
- Part 2 Environmental baseline report;
- Part 3 Assessment matrices; and
- Part 4 Schedule of non-significant effects.

9.1.5 The extent of the landscape and visual study area, the distribution of visual receptor viewpoints and the location of verifiable photomontages has been discussed with Staffordshire County Council (SCC), Lichfield District Council (LDC) and Tamworth Borough Council (TBC). Summer field surveys, including photographic studies of LCA and visual assessment of viewpoints, were undertaken from July 2012 to October 2012 and from May 2013 to July 2013. Winter surveys were undertaken from November 2012 to March 2013.

## 9.2 Scope, assumptions and limitations

9.2.1 The assessment scope, key assumptions and limitation for the landscape and visual assessment are set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and

the SMR Addendum (Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

9.2.2 The study area has been informed by the construction and operational phase zones of theoretical visibility (ZTV), which are shown Volume 5: Map Book – Landscape and visual assessment, Maps LV-07 and LV-08. The ZTV has been produced in line with the methodology described in the SMR Addendum (Volume 5: Appendix CT-001-000/2), and is an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover will mean the actual visibility is substantially less than that shown in the ZTV. Tall construction plant (e.g. cranes and piling rigs) are excluded from the ZTV for the construction phase and overhead line equipment is excluded from the ZTV for the operational phase, but these are described and taken in to account in the assessment of effects on landscape character areas and visual receptors.

9.2.3 LCA and visual receptors within approximately 1km of the Proposed Scheme have been assessed.

9.2.4 During the baseline survey there were some areas which were inaccessible (such as private land, commercial premises and residential buildings). In these instances, professional judgement has been used to approximate the likely views from these locations.

## 9.3 Environmental baseline

### Existing baseline

#### *Landscape baseline*

9.3.1 The landscape character of this area varies from the low-lying undulating farmlands east of Tamworth and around Middleton and Drayton Bassett, to the more pronounced hills and plateaux north around Hints and Weeford, and towards Lichfield.

9.3.2 At Drayton Bassett, the pattern of scattered farms and cottages in gently sloping land contrasts with the rolling sandstone hills to the north and west around Hints. The Black Brook valley divides the hills around Hints and Hopwas, from the broader open slopes of Packington and Whittington Heath.

9.3.3 Land use is predominantly arable, but includes some pasture, horticultural and equestrian uses. The wooded hills and areas of old pasture around Hints create an intimate landscape. There are also intensive horticulture, soft fruit farming, and several active quarries. The parklands at Swinfen Hall and Freeford Manor contribute to a diverse landscape.

9.3.4 The rural area between Lichfield and Tamworth includes villages, hamlets, farms and cottages with individual and groups of listed buildings and scheduled monuments. The landscape around Lichfield forms the setting for Lichfield Cathedral and renowned 'three spires'.

9.3.5 Vegetation patterns are closely linked to landform and land use. Some hedgerows are in good condition, but agricultural intensification has led to gaps or removal in some areas. Trees in hedgerows, tree belts and along watercourses, combined with

undulating landform and small woods gives an impression of a well wooded landscape with a sense of enclosure. Parklands at Swinfen Hall, Freeford Manor and DMS Whittington (Whittington Barracks) are notable features.

9.3.6 Major roads include the M6 Toll, the A38 (Bassets Pole to Lichfield), the A453 Sutton Road (Sutton Coldfield to Tamworth), the A5 (linking the A38 at Weeford to Tamworth) and the A51 Tamworth Road, past Whittington. A network of public rights-of-way (PRoW) provides access across the area.

9.3.7 LCA have been defined with reference to the SCC Supplementary Planning Guidance (SPG) document 'Planning for Landscape Change[41].

9.3.8 Descriptions of all LCA are provided in Volume 5: Appendix LV-001-021 Part 2. For the purposes of this assessment the study area has been sub-divided into three discrete LCA. A summary of these LCA is provided below. The LCA are shown in Volume 5: Map Book – Landscape and visual assessment, Maps LV-02-088b to LV-02-092a.

### Lowland Village Farmlands LCA

9.3.9 Nucleated villages occupy a rolling lowland landscape of mixed farming in a semi-regular pattern of medium and large hedged fields with scattered small woods. The hedgerows pattern and variable density of the tree cover restricts views through the landscape. In some locations unmanaged hedges have become overgrown and gappy. Hedgerows coalesce with the edges of adjoining small woodlands to give a strong sense of enclosure. Major roads and canals have a strong localised influence although the road network is relatively sparse. There are commercial buildings, and 20th century and more modern residential developments are frequent. The condition of the landscape is considered good due to the intact, well-hedged field structure. The LCA is considered to be of local value for its open, rural setting and good network of PRoW. Therefore, this area has a medium sensitivity to change.

### Sandstone Hills and Heaths LCA

9.3.10 The topography varies between 80 and 150m AOD across the LCA from the southern side of Bangley Lane (locally known as Waggoner's Lane) to the A5 at Watling Street. Agricultural land ranges pasture of an irregular small-scale field pattern enclosed by tall hedges to intensive arable farming with gappy hedgerows and declining trees. Where field boundaries are intact and well-maintained, they strongly influence landscape character. The undulating landform is deeply cut by stream valleys framing views. Former heathlands are indicated by a more regular field pattern and straight lanes with some bracken and birch woodland. Woodland crowns the low rounded hills west of Hints, though conifer plantations dominate some areas of higher ground. Settlements range from small villages to farmsteads and improved former farm cottages, and the limited network of local roads results in a tranquil setting. The condition of this LCA is considered to be good due to the predominantly well-managed field hedgerows and woods. The landscape is of district value, reflecting

[41] Staffordshire County Council (2000), *Supplementary Planning Guidance 'Planning for Landscape Change'* (SCC, Development Services Department, 2000).

the largely tranquil landscape (as reflected by its designation as a Landscape Maintenance area by the SPG)[42]. Therefore, this area has a high sensitivity to change.

### Sandstone Estatelands LCA

9.3.11 This landscape character area comprises a landscape of small villages and cottages set in a regular pattern of large arable hedged or open fields and includes woodlands and parklands of traditional rural estates, including those at Packington and Swinfen Halls. Landform is gently undulating, with limited hedgerows and few hedgerow trees. In pastoral areas, gapped hedgerows are important landscape features. Overall landscape condition is fair. The survival of scarce semi-natural heathland, such as at Whittington and as bracken and birch in woods and sparsely treed hedgerows is critical to maintaining landscape character and quality. Incongruous features include some large modern farm buildings, power lines, recent housing developments and busy main roads, resulting in a medium level of tranquillity. This landscape is of local value due to the extensive network of PRoW and the setting it provides for the Heart of England Way. Therefore, this area has a medium sensitivity to change.

## *Visual baseline*

9.3.12 Descriptions of the identified representative viewpoints are provided in Volume 5: Appendix LV-001-021, Part 2. A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are shown on Volume 2: CFA21 Map Book, Maps LV-03-088 to LV-03-092 and LV-04-088 to LV-04-092. The viewpoints are numbered to identify their locations. In each case, the middle number (xxx.X.xxx) identifies the type of receptor that is present in this area – 2: Residential, 3: Recreational, 4: Transport.

9.3.13 No protected views have been identified within the study area.

9.3.14 Residential receptors have a high sensitivity to change and include scattered farmsteads and individual properties as well as small hamlets and villages, such as Hints, Weeford, Drayton Lane and Drayton Bassett. Views are typically across agricultural fields. The combination of gently undulating landform and more pronounced hills combine with hedgerows, trees, small woodlands and copses and larger woodland blocks to create a diverse range of views which vary in the distance and field of view.

9.3.15 Recreational receptors, also with a high sensitivity to change, are located on PRoW throughout the study area, including the Heart of England Way. Viewpoints are typically in rural locations, looking across agricultural land with a diverse degree of enclosure subject to the extent of local vegetation and type of landform.

9.3.16 Viewpoints from roads generally represent the network of minor roads crossing this area, which have a medium sensitivity to change. Travellers on main roads, including the A5 and the A38, have a low sensitivity to change. Typical views from the local road network are of arable fields and grazing pasture, within a setting of woodland and tree-lined watercourses. There are also views from the A5 and local roads to the high quality rolling landscape around Hints.

[42] Staffordshire County Council (2000), *Supplementary Planning Guidance 'Planning for Landscape Change'* (SCC, Development Services Department, 2000).

### Future baseline

9.3.17 A summary of committed developments which are assumed to be built and occupied prior to either the construction or operation of the Proposed Scheme is provided below, along with the consequential effect on the character of LCA and nature of views. Developments which will introduce new visual receptors which may be significantly affected are also described. These developments are shown on Volume 5: Map Book – Cross Topic, Maps CT-13-059 to CT-13-061.

#### *Construction (2017)*

9.3.18 Volume 5: Appendix CT-004-000 provides details of the committed development proposals which are assumed to have been implemented by 2017. Where planning permission for these developments include the implementation of a landscape scheme, any new planting will not be established by the time construction commences for the Proposed Scheme and as such will not provide any intermediate screening between the new developments and the construction of the new railway which will commence in 2017. Therefore, the sensitivity of each of the areas affected by proposed developments listed below will be unchanged for the assessment of affects during construction:

- the demolition and replacement of an existing barn at Draytonlane End Farm, Sutton Road;
- the erection of a general purpose agricultural building at 17 Flats Lane, Whittington Heath;
- the change in use class of buildings at Packington Moor Farm, Jerry's Lane, from B1 (storage) to B2 (offices) will introduce a new receptor (receptor type defined as place of employment);
- the change in use of traditional barns to form two residences at Horsley Brook Farm, Tamworth Road will introduce new residential receptors; and
- the change in use of stables to form accommodation for work riders at Horsley Brook Farm, Tamworth Road will introduce a new residential receptor.

#### *Operation (2026)*

9.3.19 Volume 5: Appendix CT-004-000 also identifies the projects that form part of the future baseline for operation. The developments identified as relevant future baseline up to construction of the Proposed Scheme will continue to be present during operation. Therefore, these will continue to be valid receptors during the operational phase.

## 9.4 Temporary effects arising during construction

9.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works will be visible in many locations and will have the potential to give rise to significant temporary effects which cannot be mitigated practicably. Such effects are temporary and vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main civil engineering works will take

place, including establishment of compounds, main earthworks and structure works. The effects associated with the peak construction phase in this CFA will generally be considered to be long term given the construction programme (see Section 2.3).

9.4.2 Overall, civil engineering works in this area will be undertaken between the start of 2018 and the end of 2021. The Cappers Lane main compound will be in place for approximately six years. Satellite compounds would be in place for between approximately one and four and a half years. The civil engineering works at most individual sites along the route in this area would occur for a period of between approximately one and two years, with the Swinfen cutting taking over two years. Effects during other phases of works are likely to be lesser due to less construction equipment being required at the time and a reduced intensity of construction activity.

9.4.3 The construction works that have been taken into account in determining the effects on landscape and visual receptors include:

- construction of Trickley Coppice embankment;
- construction of Drayton Bassett viaduct;
- construction of Drayton Lane cutting including Drayton Lane overbridge, the A453 Sutton Road overbridge, Drayton Bassett Footpath 11 overbridge, and Bangley Lane (Hints Bridleway 20) accommodation overbridge;
- construction works associated with the permanent diversion of Shirrall Drive and PRoW Drayton Bassett Bridleway 10;
- construction of Hints embankment including Hints Footpath 9 underpass;
- construction of Hints cutting including Hints Footpath 14 green overbridge;
- construction of Milditch Wood embankment, including Brockhurst Lane underbridge;
- construction of Black Brook viaduct and balancing ponds to the west and east;
- construction of Swinfen cutting;
- construction works for the temporary realignment of Watling Street, and for the A5 trunk road (Weeford-Fazeley improvement) overbridges;
- construction works associated with the realignment of Flats Lane and Knox's Grave Lane, including Flats Lane overbridge;
- construction works associated with the Horsley Brook Farm green overbridge;
- construction works associated with the A51 Tamworth Road overbridge;
- general construction activity including demolitions, earthworks (including topsoil stripping and stockpiling), temporary haul roads (10m wide alongside the earthworks footprint), formation of batters and profiling, piling and formation of structures and security fencing;

- general construction plant, equipment and associated infrastructure including cranes, batching plants; and
- temporary road and PRoW diversions and temporary closures.

## Avoidance and mitigation measures

9.4.4 Measures that have been incorporated into the draft Code of Construction Practice (CoCP) to avoid or reduce landscape and visual effects during construction include the following (see Volume 5: Appendix CT-003-000):

- maximising the retention and protection of existing trees and vegetation where possible;
- use of well-maintained hoardings and fencing;
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses;
- replacement of any trees intended to be retained which may be accidentally felled or die as a consequence of construction works;
- early implementation of planting and other landscape measures where there is no conflict with construction activities or other requirements of the Proposed Scheme;
- the appropriate maintenance of planting and seeding works and implementation of management measures, to continue through the construction period as landscape works are completed; and
- methods to monitor and manage flood risk and other extreme weather events which may affect landscape and visual resources during construction.

9.4.5 These measures have been taken account of in the assessment of the construction effects below.

## Assessment of temporary impacts and effects

9.4.6 The most apparent changes to landscape character and viewpoints during construction will be due to the temporary presence of construction plant and the removal of existing landscape elements, such as trees, hedges and agricultural land. Changes will be most notable along the embankments crossing the landscape between Middleton and Drayton Bassett and at cuttings adjacent to Hints and at Packington Moor. Construction of viaducts at Drayton Bassett and Black-Bourne Brook and road realignments and overbridges (including temporary diversions where required),(for example at Drayton Lane, the A453 Sutton Lane, Bangley Lane, Watling Street, the A5, Weeford-Fazeley improvement, Flats Lane and the A51 Tamworth Road, will be key issues. The height of construction plant and viaducts and the often close proximity of construction activities to viewpoints, coupled with the potential absence of intervening screening (apart from site hoardings) will result in significant visual effects during construction. The landform in certain locations and the retention of vegetation where possible will partially screen low level construction activity.

### *Landscape assessment*

9.4.7 The following section describes the likely significant effects on LCA during construction. All LCA within the study area considered to experience a non-significant effect (minor adverse or negligible) are described in Volume 5: Appendix LV-001-021, Part 4.

#### Lowland Village Farmlands LCA

9.4.8 Construction activities within this LCA will occur from the county boundary with Warwickshire to south of Waggoner's Lane. It will result in a change from an agricultural landscape to one dominated by construction along a broad corridor initially due to the removal of field boundary vegetation and field severance, and subsequently to the progression of works. Although these changes, together with increased traffic and the presence of construction plant reducing tranquillity will be localised, they will be out of character for the LCA. Lighting at worksites will be noticeable. Therefore, the magnitude of change to this LCA will be high.

9.4.9 The high magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a major adverse effect.

#### Sandstone Hills and Heaths LCA

9.4.10 Within this LCA, construction activities will extend from south of Bangley Lane (known locally as Waggoner's Lane) to Watling Street. Along the route, construction will remove field boundary vegetation along a broad corridor, reducing the sense of enclosure locally. North of Bangley Lane, embankment and viaduct construction through the rolling landscape west of Hints, with the removal of woodland at Roundhill Wood, the Rookery and Job's Hill Plantation will be at variance with the local character of the LCA. Increased traffic movements will substantially reduce local tranquillity. Therefore; the magnitude of change to this LCA will be high.

9.4.11 The high magnitude of change, assessed alongside the high sensitivity of the character area, will result in a major adverse effect.

#### Sandstone Estatelands LCA

9.4.12 Construction activities within this LCA will occur from Watling Street to the boundary with CFA22. The removal of vegetation will increase the openness locally, due to the further fragmentation of a weak hedgerow network and the loss of some prominent woodland, such as along the Heart of England Way at Packington Moor. The excavation of the deep cutting from Packington Moor to Whittington Heath will substantially disrupt the important local ridgeline. Lighting at worksites will be notable in an elevated, open landscape, and construction traffic will reduce local tranquillity. In CFA22 the character of this area will be substantially altered through the removal of vegetation and the introduction of new infrastructure. Therefore, due to the changes in setting within this CFA, and the changes in character described in CFA22, the magnitude of change is considered to be high

9.4.13 The high magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a major adverse effect.

### *Visual assessment*

9.4.14 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken during winter, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, will be in leaf. Where residential receptors experience significant effects at night-time arising from additional lighting, these are also presented in this section. Representative viewpoints within the study area considered to experience a non-significant effect (minor adverse or negligible) are described in Volume 5: Appendix LV-001-021, Part 4.

9.4.15 The number identifies the viewpoint locations which are shown in Volume 2: CFA21 Map Book, Maps LV-03-088 to LV-03-091. In each case, the middle number (xxx.X.xxx) identifies the type of receptor that is present in this area – 2: Residential, 3: Recreational, 4: Transport, 5: Hotels and Healthcare, 6: Employment and 7: Sports.

9.4.16 Where a viewpoint may represent multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity may be lower than those reported.

#### Viewpoint 330.3.002: View west from PRoW Drayton Bassett Footpath 13, between Drayton Bassett and Middleton

9.4.17 Construction activity that will include the removal of hedges and trees along the route will be visible in the middle ground, followed by the construction of Drayton Bassett viaduct and the embankments to the north and south. Construction plant movements, worksites and taller equipment such as cranes and piling rigs will be visible, though lower elements will be partially screened by intervening vegetation. The magnitude of change will be high.

9.4.18 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

#### Viewpoints 330.2.003 and 332.3.002: Views south-west from The Pump House at Brook Farm and from the PRoW Heart of England Way, on Drayton Lane

9.4.19 Field boundaries and trees across the middle ground of this view towards rising ground will be removed for the construction of embankments north and south of Drayton Bassett viaduct. Intervening hedges will partially screen lower elements of the Proposed Scheme, however, plant movements and taller equipment such as cranes and piling rigs will be visible. The appearance of the viaduct and embankments under construction will form a new background to the view. The magnitude of change will be medium.

9.4.20 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

### Viewpoints 330.2.005, 330.2.006 and 332.2.001: Views south-west from Drayton Lane and the residential edge of Drayton Bassett

9.4.21 Construction of the Proposed Scheme will be visible in the middle and background of these views, on rising ground towards the Trickley Coppice embankment. These long views will be partial and filtered by intervening vegetation but will include taller equipment such as cranes and piling rigs and works at the Drayton Bassett viaduct. The magnitude of change will be low.

9.4.22 The low magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects.

### Viewpoints 331.3.001 and 331.2.002: View east from PRoW Drayton Bassett Footpath 10, close to Shirrall Hall Farm and from Shirrall Hall Farm and Pool Farm

9.4.23 Construction activity associated with a section of the route between the realignment of Drayton Lane onto overbridge and Drayton Bassett viaduct will be visible in the middle ground of this view. However, the views of the Proposed Scheme will be restricted by intervening vegetation due to part of the route being in cutting, although taller construction equipment will be visible. The magnitude of change will be low.

9.4.24 The low magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects.

### Viewpoint 331.3.003: View north-east from PRoW Drayton Bassett Footpath 9, near Shirall Hall Farm

9.4.25 The removal of field boundaries and trees along the route and the demolition of some properties on Drayton Lane will be visible in the middle ground. Views of construction activities for Drayton Lane cutting, Drayton Lane overbridge and A453 Sutton Road overbridge and a satellite construction compound will be visible, although intervening vegetation will screen lower level elements. The magnitude of change will be high.

9.4.26 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoints 332.2.003 and 332.3.004: Views south-west from Heathley Farm and to the south from the PRoW Drayton Bassett Footpath 2, between Heathley Farm and Hill Farm

9.4.27 The removal of field boundaries and trees along the route north of the Drayton Bassett viaduct will be seen in the background from these views, partially screened by agricultural buildings and storage in the foreground and by intervening vegetation in the middle ground. The taller elements of construction plant and piling rigs for the Drayton Lane and the A453 Sutton Road overbridges and at Drayton Lane/Shirall Drive compound will be visible. The magnitude of change will be low.

9.4.28 The low magnitude of change, assessed alongside the high sensitivity of these receptors, will result in a moderate adverse effect.

### Viewpoint 332.2.005: View to the south from Oak Farm, Drayton Lane/ The Heart of England Way

9.4.29 The upper elements of cranes and piling rigs used to construction Drayton Bassett viaduct will be visible in the background of this view, filtered by intervening field boundary vegetation. Two satellite construction compounds and works for a balancing pond and access road north of the viaduct will be visible in the middle ground. The magnitude of change will be medium.

9.4.30 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse effect.

### Viewpoint 333.3.001: View north-east from PRoW Drayton Bassett Footpath 9 at Loddy Wood, north of Shirall Hall Farm

9.4.31 The removal of vegetation and the demolition of some properties along Drayton Lane will be visible in the middle ground of this view, seen over field and lane boundary hedges. Views will include plant movements, a satellite construction compound and taller equipment associated with the cutting between the overbridges for Drayton Lane and the A453 Sutton Road. The magnitude of change will be high.

9.4.32 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoints 333.2.002, 333.3.006 and 333.3.007: Views to the north-east from Drayton Lane (on the Heart of England Way) including Draytonlane End Farm (off the A453 Sutton Road), and adjacent to Barn Cottage, Lone Oak and Cranebrook

9.4.33 Roadside and field boundary hedgerows along the A453 Sutton Road and Drayton Lane will be removed in the foreground of this view, increasing the visibility of elements in the middle ground and background. Some residences visible in the foreground on Drayton Lane will be demolished. Works and plant movements associated with the Drayton Lane and the A453 Sutton Road overbridges and route in cutting will be prominent. Also visible will be works for the diversion of a section of overhead electricity line. The magnitude of change will be high.

9.4.34 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

### Viewpoint 333.3.004: View east from PRoW Drayton Bassett 12 (on the Heart of England Way)at Bangley Lane

9.4.35 The construction works will be visible in the middle ground marked by the clearance of vegetation along the route, seen above intervening field boundary hedgerows. The excavation of Drayton Lane cutting will be visible from north of the A453 Sutton Road overbridge, towards the Bangley Lane (Hints Bridleway 20) accommodation overbridge, until obscured by garden vegetation at Bangley Farm and mature trees along Bangley Lane. The magnitude of change will be high. The view of the Proposed Scheme in the winter during construction is illustrated on the photomontage shown in Figure LV-01-206 (Volume 2: CFA21 Map Book).

9.4.36 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 333.3.005: View east from PRoW Drayton Bassett Footpath 11, near Great Bangley Farm

9.4.37 The demolition of buildings at White House Farm on Bangley Lane (known locally as Waggoner's Lane), and the removal of vegetation and sections of field boundaries in the immediate foreground for the cutting between the A453 Sutton Road and to the north of Bangley Lane, will be in the foreground of the view. Construction activity associated with the cutting will be visible, including the Drayton Bassett Footpath 11 overbridge. Therefore, the magnitude of change will be high.

9.4.38 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 334.3.001: View north-west from Drayton Lane (part of the Heart of England Way)

9.4.39 The removal of roadside vegetation on Drayton Lane in the foreground of this view will allow oblique views to the demolition of some properties on Drayton Lane in the middle ground. Drayton Lane/Shirall Drive compound and the construction of the Drayton Lane overbridge will be visible in the foreground. Works, plant movements and taller equipment at the A453 Sutton Road overbridge will be seen in the middle ground, as will the diversion of a section of overhead electricity line. The magnitude of change will be high.

9.4.40 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 334.2.002: View south-west adjacent to Hill Farm and Bourne Croft

9.4.41 The visibility of construction activity will be limited to the taller elements of plant movements and works for the A453 Sutton Road and Drayton Lane overbridges and for the excavation of the Drayton Lane cutting in the middle ground. These views will be filtered by intervening field boundaries and linear woodland, therefore, the magnitude of change will be low.

9.4.42 The low magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect.

### Viewpoint 334.3.003: View west from PRoW Drayton Bassett Footpath 11, off the A453 Sutton Road, close to Oakleigh

9.4.43 The removal of vegetation for the Proposed Scheme in cutting north of the A453 Sutton Road overbridge towards Bangley Lane will be visible in the middle ground, filtered by intervening field boundary vegetation. Construction works for the cutting and for Drayton Bassett Footpath 11 overbridge and Bangley Lane (Hints Bridleway 20) accommodation overbridge will be visible including taller equipment such as cranes and piling rigs. A satellite compound at south of Bangley Lane will be visible as a minor element in these views. Therefore, the magnitude of change will be medium.

9.4.44 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoints 335.3.001 and 335.2.002: Views north-east from PRoW Hints Footpath 20, (on the Heart of England Way), Bangley Lane and Hints Farm complex (Hints Farm House, Flaad House, Hallsdean and The Hayloft

9.4.45 The removal of field boundary and woodland vegetation along the route of the cutting either side of the Bangley Lane (Hints Bridleway 20) accommodation overbridge, and northwards along a section of low embankment to the Hints cutting will be visible in the middle ground, though filtered by intervening roadside and field boundary vegetation. Therefore, the magnitude of change will be medium.

9.4.46 The medium magnitude of change, assessed alongside the high sensitivity of these receptors will result in major adverse effects.

### Viewpoint 335.3.003: View east from PRoW Hints Footpath 15(a) (on the Heart of England Way)

9.4.47 The removal of vegetation and field boundaries for the construction of the route in shallow cutting north and south of Bangley Lane will be visible in the middle ground. Due to the extent of intervening field boundary vegetation, views will be of taller elements of construction including the Bangley Lane (Hints Bridleway 20) accommodation overbridge and of satellite construction compounds north and south of Bangley Lane. Therefore, the magnitude of change will be high.

9.4.48 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoints 335.2.004, 337.2.002 and 337.2.004: Views north-east from Brockhurst Farm, from Brockhurst Lane adjacent to White Owl Farm and east from the Heart of England Way near Rookery Farm

9.4.49 The vegetation in the middle ground, including the loss of distinctive woodland on the skyline at Round Hill, will be removed to construct the deep cutting and environmental earthworks for the Proposed Scheme west of Hints. Views will include works for the Hints Footpath 9 underpass and Hints Footpath 14 green overbridge. Therefore, the magnitude of change will be high.

9.4.50 The high magnitude of change, assessed alongside the high sensitivity of these receptors will result in major adverse effects.

### Viewpoints 336.2.001, 336.2.002, 336.2.003 and 336.2.004: Views south-west from Orchard Farm, Bangley Lane, Lower Bangley on Bangley Lane and from PRoW Hints Footpath 20, near Fordway Farm

9.4.51 Bangley Lane (Hints Bridleway 20) accommodation overbridge and taller elements of construction plant for the shallow cutting north and south will be visible in the foreground to middle ground of these views. From viewpoint 336.2.001, there will be some visibility of the construction of the balancing pond and access road in the foreground, off Bangley Lane. From the other viewpoints, the visibility of the route in the middle ground will be filtered or partly screened by intervening farm buildings and

field boundaries, with taller equipment such as cranes and piling rigs marking the presence of the route. Therefore, the magnitude of change is considered to be high.

9.4.52 The high magnitude of change, assessed alongside the high sensitivity of these receptors will result in major adverse effects.

9.4.53 At night, the lighting of the satellite construction compound for Bangley Lane (Hints Bridleway 20) accommodation overbridge will be visible in a previously unlit location, in the foreground and middle ground of the views, with some partial screening by intervening vegetation. Therefore, the magnitude of change to the receptor at 336.2.001 at night is considered to be medium, resulting in a moderate adverse effect.

### Viewpoint 336.2.004: View south-west from PRoW (Drayton Bassett Footpath 3) bridleway near New House Farm

9.4.54 Construction works will initially be marked by the removal of field boundary vegetation in the middle ground. The construction of environmental earthworks between the A453 Sutton Road and Bangley Lane will be visible, as will the construction of the Drayton Bassett Footpath 11 overbridge, Bangley Lane (Hints Bridleway 20) accommodation overbridge and taller elements of construction equipment. Therefore, the magnitude of change is considered to be medium.

9.4.55 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect.

### Viewpoint 336.2.006: View south-west from Holt Farm/The Old Barn

9.4.56 The construction of the Proposed Scheme will be visible across a broad arc in the foreground and middle ground, initially marked by the demolition of buildings at White House Farm on the left of the view, and by the removal of field hedgerows and trees along the route from Bangley Lane north towards Roundhill Wood. Works for the Bangley Lane (Hints Bridleway 20) accommodation overbridge will be marked by the visibility of taller elements of construction plant. Extensive areas of environmental mounding will be visible in the foreground and middle ground as the route changes north of Bangley Lane from cutting to low embankment approaching Roundhill Wood. Therefore, the magnitude of change will be high.

9.4.57 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

### Viewpoint 337.3.001: View east from the Heart of England Way

9.4.58 A short section of the Proposed Scheme will be visible, seen as cutting through a landscape of low rounded hills in the middle ground, west of Hints. The construction of the Hints Footpath 14 green overbridge will be visible, as will taller elements of construction plant. However, visibility will be filtered by intervening vegetation and topography. Therefore, the magnitude of change will be low.

9.4.59 The low magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect.

### Viewpoint 338.3.001: View south-west from PRoW Hints Footpath 13, off Brockhurst Lane

9.4.60 Trees in the foreground and middle ground of this view will be removed during construction. The Proposed Scheme will be in cutting south of Brockhurst Lane underbridge, and the presence of construction plant required for the section in cutting, for the underbridge and for the embankment north of Brockhurst Lane will be prominent. A satellite construction compound will be visible in the foreground. Also visible will be the removal of some woodland edges and the slopes of low rounded hills in the middle ground. There will be oblique views to Hints cutting and the Hints Footpath 14 green overbridge, including taller works equipment such as cranes in the middle ground. Therefore, the magnitude of change will be high.

9.4.61 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 338.2.002: View south-west from the edge of Hints

9.4.62 The removal of trees and woodland on the slopes and tops of low rounded hills west of Hints will be visible in the foreground and middle ground. Construction works and plant movements associated with the Hints cutting and environmental earthworks, the Hints Footpath 14 green overbridge and compound will be visible in the middle ground. The construction of Brockhurst Lane underbridge will be visible seen through intervening narrow tree belts, as will a satellite construction compound. Temporary material stockpiles along the western side of the Black Brook valley will be prominent in the foreground Therefore; the magnitude of change will be high.

9.4.63 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

9.4.64 At night, the lighting of the satellite construction compounds for Brockhurst Lane underbridge and the Hints Footpath 14 green overbridge will be partially visible in the middle ground, in a presently unlit landscape. Due to the distance from the receptor and the intervening vegetation, the magnitude of change to this receptor at night is considered to be medium, resulting in a moderate adverse effect.

### Viewpoints 338.3.003, 340.2.002 and 340.3.005: Views south-west from Prow Hints Footpath 6, near Home Farm, from Watling Street and from PRoW Hints Footpath 1(a), to the rear of properties at Watling Street, Hints

9.4.65 The Proposed Scheme will be seen in the middle ground west of Hints village which will be largely hidden in the valley, with the low rounded wooded hills west of Hints in the background. Vegetation removal in areas of Roundhill Wood and Rookery Wood will be visible in the middle ground, and construction plant movements north of Bangley Lane for the Hints embankment and cutting including the Hints Footpath 14 green overbridge and several satellite construction compounds, together with taller plant such as cranes and piling rigs. Therefore, the magnitude of change will be high.

9.4.66 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

### Viewpoints 338.2.004 and 338.2.005: View south-west from Bangley Lodge Farm and from property on Watling Street, Hints

9.4.67 There will glimpsed views through narrow gaps in roadside hedges and at gates, over the Black Brook valley to the route cutting across low rounded hills in the middle ground. Views will include the removal of field boundary and woodland at Roundhill Wood and on the edges of Rookery Wood, and of plant movements and works for the Hints cutting and Hints Footpath 14 green overbridge. However, due to intervening vegetation limiting the opportunities for these views, the magnitude of change will be medium.

9.4.68 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects.

### Viewpoints 339.3.001 and 340.2.003: View to the east from PRoW Hints 5 (part of the Heart of England Way), near Bourne House and south-west from 'The Lodge'

9.4.69 There will be views of the removal of vegetation along the Black Brook valley in the foreground and middle ground. There will also be views in the foreground of the Black Brook viaduct compound, and works at the Black Brook viaduct, the adjacent balancing ponds and access roads. The low embankment as the route skirts Job's Hill will be also be visible in the middle ground. Therefore, the magnitude of change is considered to be high.

9.4.70 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

9.4.71 At night, the lighting of the satellite construction compound for the Black Brook viaduct will be visible in the foreground of viewpoint 340.2.003, in a landscape which, at present, is largely unlit. Due to the proximity to this receptor, the magnitude of change at night is considered to be high, resulting in a major adverse effect.

### Viewpoint 339.3.002: View to the north from PRoW Hints Footpath 5 (part of the Heart of England Way) near Job's Hill

9.4.72 There will be views of the removal of vegetation along the Black Brook valley in the middle ground. Construction works for the Black Brook viaduct, the western balancing ponds and access road, and the cutting to the north will be visible, as will the Black Brook viaduct compound. Construction plant and works for the A5 (Weeford to Fazeley improvement) overbridge will be visible, in the background. Therefore, the magnitude of change will be high. The view of the Proposed Scheme in the winter during construction is illustrated on the photomontage shown in Figure LV-01-207 (Volume 2: CFA21 Map Book).

9.4.73 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 340.3.001: View west from PRoW Hints F/P 0.378) near Black Brook in Hints

9.4.74 Vegetation along Black Brook will filter views along the shallow valley to construction works in the middle ground associated with the Milditch Wood embankment and

Black Brook viaduct. The removal of areas of trees in Job's Hill will be prominent in the background of the view. There will also be filtered views of temporary materials stockpiles on the western slopes of the valley. Therefore, the magnitude of change will be high.

9.4.75 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 341.2.001: View north-east from properties on the A5 Watling Street (23 Watling Street)

9.4.76 The removal of areas of roadside vegetation along the A5 Watling Street, the demolition of properties at Buck's Head Farm and temporary diversion works will allow views of the construction works for Swinfen Hall cutting in the foreground. There will also be views of the A5 (Weeford to Fazeley improvement) overbridge in the middle ground, filtered by intervening vegetation. Therefore, the magnitude of change will be high.

9.4.77 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoints 341.2.002 and 341.2.008: View north-east from residential properties on Flats Lane

9.4.78 The removal of field boundaries and trees along the Proposed Scheme and of construction works for the Swinfen cutting north of the A5 (Weeford-Fazeley improvement) will be visible in the middle ground. Flats Lane overbridge satellite compound will be visible in the middle ground, as will the construction of the Flats Lane auto-transformer station and access road and works for Flats Lane realignment over Swinfen cutting. Therefore, the magnitude of change will be high.

9.4.79 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

9.4.80 At night, there will be views to the lighting of the satellite compounds at Flats Lane which will be intrusive within the largely unlit context, although partially filtered by intervening garden boundary vegetation. Therefore, the magnitude of change to these receptors at night is considered to be medium, resulting in a moderate adverse effect.

### Viewpoint 341.4.007: View north-east from Flats Lane on overbridge across the A5

9.4.81 Taller elements associated with construction works for the Swinfen cutting will be visible in the middle ground between the A5 Watling Street and Flats Lane. The A5 (Weeford to Fazeley) Improvement overbridge satellite compound will be in the foreground of the view, with views along the A5 corridor to works for construction of the A5 overbridge over the route in the middle ground. Views northwards will include the construction of the Flats Lane auto-transformer station and access road in the middle ground. Therefore, the magnitude of change is considered to be high.

9.4.82 The high magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a moderate adverse effect.

### Viewpoint 342.2.001: View north-west from Buck's Head Cottages

9.4.83 The Proposed Scheme will be visible beyond intervening field boundary vegetation, in the middle ground of the view. Taller elements of construction plant for the Swinfen cutting, for the A5 (Weeford-Fazeley improvement) Improvement overbridge and in a satellite construction compound north of the A5, will be visible. Construction works for Flats Lane overbridge will also be visible. Therefore, the magnitude of change is considered to be high.

9.4.84 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 342.3.002: View to the west from PRoW Hints Footpath 4 (on the Heart of England Way), near Buck's Head Farm

9.4.85 Visual effects during construction will include the removal of field boundaries and trees for the route and the demolition of buildings at Buck's Head Farm in the foreground. Construction works for Swinfen cutting will be seen across a broad arc of the foreground of the view, including temporary soil stockpiles alongside both sides of the cutting. Views will include taller elements of construction plant at the A5 (Weeford to Fazeley) Improvement overbridge and in satellite construction compounds off Flats Lane. Further north to the right of the view, works for Flats Lane/Knox's Grave Lane realignment will be visible beyond intervening field boundaries in the background. Therefore, the magnitude of change will be high.

9.4.86 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 343.3.001: View east from Tamworth Lane, PRoW Swinfen and Packington 5

9.4.87 The demolition of buildings at Packington Moor Farm and construction works for Swinfen cutting will be visible in the middle ground of the view north of Tamworth Lane, seen beyond intervening field hedges and small woods. Construction works for the Flats Lane/Knox's Lane realignment will be visible in the background, on the right of the view. Therefore, the magnitude of change will be medium.

9.4.88 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 343.3.005: View north-east from PRoW Swinfen and Packington Footpath/bridleway 5on Swinfen Lane

9.4.89 The Proposed Scheme will be visible in the middle ground, seen between woodland blocks and field boundaries in the foreground. Construction works for Swinfen cutting north of Flats Lane will be visible. Taller elements of construction plant and works at Flats Lane and Knox's Lane realignment will be visible on the right of the view between gaps in existing field boundaries, in the background. Therefore, the magnitude of change will be medium.

9.4.90 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoints 344.3.001 and 344.3.002: Views west from the junction of PRoW Swinfen and Packington Footpath 6(part of the Heart of England Way) on Knox's Grave Lane, and north-west from PRoW Footpath Swinfen and Packington 6, on the Heart of England Way near Packington Moor

9.4.91 Construction activity associated with the Swinfen cutting will occupy the middle ground of these views. The demolition of several buildings at Packington Moor will be visible in the middle ground. Works for the Flats Lane realignment including property demolitions and piling rigs will be visible in the middle ground for viewpoint 344.3.001. Therefore, the magnitude of change is considered to be high for both of these viewpoints.

9.4.92 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

### Viewpoint 344.4.003: View west from the junction of Jerry's Lane with the access track leading to Packington Moor Farm and from future employment and recreational receptors at Packington Moor Farm

9.4.93 The demolition of several properties and the removal of vegetation at Packington Moor Farm for the Proposed Scheme will be visible in the middle ground of the view. Taller elements of construction works for Swinfen cutting, north of Flats Lane, including plant movements on haul roads and temporary soil stockpiles on both sides of the route will be visible. Therefore, the magnitude of change will be high.

9.4.94 The high magnitude of change, assessed alongside the medium sensitivity of these receptors. The high magnitude of change, assessed alongside the medium sensitivity of receptor 344.4.003, and against the high sensitivity of a future recreational receptor and the low sensitivity of an employment receptor at Packington Moor Farm will result in an overall major adverse effect for this viewpoint.

### Viewpoint 345.3.001: View north-east from PRoW Swinfen and Packington Footpath 8 (on the Heart of England Way), near Horsley Brook Farm and future residential receptors at Horsley Brook Farm

9.4.95 Excavation works for Swinfen cutting from south of Horsley Brook Farm to north of the A51 Tamworth Road will be in the foreground, middle ground and background from this viewpoint. At the A51 Tamworth Road, the removal of mature roadside trees and the demolition of the Whittington Heath Golf Club clubhouse and a residential property will be visible, together with a satellite construction compound, and taller elements of construction plant including cranes and piling rigs. Temporary material stockpiles will line the top of both sides of the cutting and movements of plant along haul routes will be prominent along the route. A new farm access track will be in the middle ground of the view. Therefore, the magnitude of change will be high.

9.4.96 The high magnitude of change, assessed alongside the high sensitivity of the receptors, will result in a major adverse effect.

### Viewpoints 345.3.002 and 345.3.004: Views east and south east from PRoW Swinfen and Packington Footpath 8 (on the Heart of England Way), near Ingleyhill Farm

9.4.97 The demolition of Whittington Heath Golf Club and satellite compound east and west of the Proposed Scheme will be visible in the middle ground. Excavation for Swinfen cutting will occupy the middle and background of these viewpoints. Construction plant movements along the route will be visible beyond temporary material stockpiles on both sides of the cutting. The construction of a new farm access track west of the route and Horsley Brook Farm green overbridge crossing the cutting will be visible in the middle ground of the view. Therefore, the magnitude of change will be high.

9.4.98 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects.

### Viewpoint 346.2.001: View south-west from Broadfields (Packington House) on Jerry's Lane

9.4.99 Taller elements associated with construction works at Flats Lane realignment, including the demolition of a group of properties on Knox Grave Lane, will be visible in the background of the view, with other works largely screened by intervening roadside and field boundary hedges, and by woodland next to the property. Therefore, the magnitude of change will be medium.

9.4.100 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

### Viewpoint 346.2.002: View south-west from residential properties at Levett Road and Jerry's Lane

9.4.101 The removal of field boundaries crossing the Proposed Scheme will be visible on the skyline in the background of this view. Taller elements of construction operations for Swinfen cutting, north and south of Flats Lane will be visible in the background, although partially screened by intervening hedgerows and small woods. Therefore, the magnitude of change is considered to be medium.

9.4.102 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect.

### Viewpoint 346.6.003: View south-west from Whittington Barracks and Museum

9.4.103 The Proposed Scheme will be in cutting across the middle ground of this view. Views to the right will include taller elements within a satellite construction compound adjacent to the A51 Tamworth Road overbridge in the middle ground, due to the removal of mature roadside trees along this section of the A51 Tamworth Road. Views of construction plant movements along haul routes will be visible above temporary material stockpiles along the top of the cutting. Therefore, the magnitude of change is considered to be high.

9.4.104 The high magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse effect.

### Viewpoint 347.2.001: View east from Forest House adjoining PRoW Swinfen and Packington Footpath 8, (on the Heart of England Way)

9.4.105 Views from this location will be of removal of field boundary vegetation along the route including mature trees on the A51 Tamworth Road crossing the Proposed Scheme in the background and middle ground of the view. The demolition of property at Whittington Golf Club and adjoining the A51 Tamworth Road will be visible in the background, though the extent of the view will be partly screened by buildings at Freeford Home Farm. Taller elements of construction plant for a satellite construction compound adjoining the A51 Tamworth Road, and for Swinfen cutting between Horsley Brook Farm and the A51 Tamworth Road will be visible, above temporary material stockpiles along the top of the cutting. Works for the A51 Tamworth Road overbridge will partly screened by buildings at Freeford Farm buildings. Therefore, the magnitude of change is considered to be high.

9.4.106 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect.

## Cumulative effects

9.4.107 Section 2.1 and Appendix CT-004-000 identify developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the baseline for the construction of the Proposed Scheme. The consequential cumulative effect of these developments on LCA and viewpoints is described below. These developments are shown in Volume 5: Map Books – Cross Topic, Maps CT-13-059 to CT-13-061a.

9.4.108 The committed developments described in Volume 5: Appendices CT-004-000/1 and CT-004-000/2 will all be completed by 2017, and therefore will not contribute to cumulative effects on landscape or views.

## Other mitigation measures

9.4.109 These effects will be temporary and reversible in nature lasting only for the duration of the construction works. Any residual effects will generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed from surrounding residential receptors, and users of PRoW and main roads within the study area.

## Summary of likely residual significant effects

9.4.110 The permanent effects of the Proposed Scheme on landscape and visual receptors have been substantially reduced through incorporation of the measures described previously. Effects in year 1 of operation may be further reduced by establishing planting early in the construction programme, which will be considered during the detail design stage. This would provide additional screening and greater integration of the Proposed Scheme into the landscape. However, no other mitigation measures are considered practicable due to the high visibility of elements of the Proposed Scheme and the sensitivity of the surrounding receptors.

## 9.5 Permanent effects arising during operation

9.5.1 The specific elements of the Proposed Scheme that have been taken into account in determining the effects on landscape and visual receptors include:

- various footbridges accommodating diversions of PRoW across the route;
- Trickley Coppice embankment;
- Drayton Bassett viaduct;
- Drayton Lane cutting;
- Drayton Lane overbridge;
- the permanent diversion of Shirrall Drive/Drayton Lane, PRoW Drayton Bassett B/W 10;
- A453 Sutton Road overbridge;
- Drayton Bassett Footpath 11 overbridge and Bangley Lane (Hints Bridleway 20) accommodation overbridge;
- Hints embankment including Hints Footpath 9 underpass;
- Hints cutting including Hints Footpath 14 green overbridge;
- Milditch Wood embankment, including Brockhurst Lane underbridge;
- Black Brook viaduct, and access roads and balancing ponds to the east and west;
- Swinfen cutting;
- Horsley Brook Farm green overbridge;
- A5 (Weeford to Fazeley) Improvement overbridge, Rock Hill overbridge and A5 Hints Bridleway 4 overbridge;
- Flats Lane auto-transformer station and access road;
- the realigned Flats Lane and Knox's Grave Lane, including Flats Lane overbridge;
- the reconstructed A51 Tamworth Road on overbridge; and
- Various ecological mitigation compensation areas, including at Gallows Brook, between A453 Sutton Lane and Drayton Lane, at Job's Hill, at Rookery Lane/Black Brook, and at Whittington Heath.

## Avoidance and mitigation measures

9.5.2 The operational assessment of impacts and effects is based on year 1 (2026), year 15 (2041) and year 60 (2086) of the Proposed Scheme. A process of iterative design and assessment has been employed to avoid or reduce adverse effects during the operation of the Proposed Scheme. Measures that have been incorporated into the design of the Proposed Scheme include:

- the design of the landscape environment around the Proposed Scheme to ensure the creation of a well-connected landscape that helps to alleviate flooding, benefits biodiversity and recreation;
- embankments and cuttings, both for the route of the Proposed Scheme and highway realignments, have been shaped so as to integrate the Proposed Scheme into the character of the surrounding landscape;
- where it is considered that a noise fence barrier will create a visual impact on neighbouring residences a landscape bund will be provided where reasonably practicable;
- where redundant sections of highway are left, these will be broken up, topsoiled and seeded to integrate the road into the local landscape;
- planting, including native broad-leaved woodland, shrub species and hedgerows will be implemented to screen the new railway from visual receptors and integrate the Proposed Scheme into the landscape; and
- selection of species will reflect tree and shrub species native to the area and take into account possible climate change impacts associated with the quality and availability of water and the potential increase in pests and diseases.

9.5.3 Specific design measures to aid in integrating the Proposed Scheme within the landscape include:

- ecological mitigation/compensation areas at Gallows Brook close to the boundary with CFA20, between the A453 Sutton Lane and Drayton Lane overbridges, to the west of Hints (both east and west of the route), and at Whittington Heath; and
- substantial areas of new planting and areas of potential advance planting.

9.5.4 These measures have been taken account of in the assessment of the operational effects below.

## Assessment of impacts and effects

9.5.5 The likely significant effects on the landscape character and viewpoints in operation will arise from new engineered landforms passing through the existing landscape. The introduction of substantial cuttings, embankments with false cuttings and also the introduction of noise barriers at some locations will create a manmade linear feature; permanent severance of land; the introduction of highway infrastructure into the rural environment, including road bridges; the introduction of overhead line equipment; and the introduction of regular high speed trains. At a number of locations, views of the Proposed Scheme will be obscured by landform, both existing and mitigation

earthworks. In most cases, effects will reduce over time as planting established as part of the Proposed Scheme matures.

### *Landscape assessment*

9.5.6 This section describes the significant effects on LCA during year one, year 15 and year 60 of operation. Non-significant effects on LCA are presented in Volume 5 Appendix LV-001-021, Part 4.

9.5.7 The assessment of effects in year 15 assume proposed planting has grown by approximately 450mm a year (i.e. trees will be 7-7.5m high). The assessment of effects in year 60 assumes all planting has reached its fully mature height.

#### Lowland Village Farmlands LCA

9.5.8 The Proposed Scheme will pass through this LCA on embankment and in cutting. Landscape impacts of the Proposed Scheme will include:

- engineered embankments crossing low-lying, undulating natural landform, forming an incongruous feature in the surrounding landscape;
- the introduction of new infrastructure into a predominantly rural context, including overhead line equipment and passing trains visible on embankment, partially screened by false cutting;
- introduction of a viaduct across Gallows Brook;
- introduction of noise barriers as a distinct linear feature, contrasting with the undulating rural landscape; and
- changes to the pattern and structure of the landscape either side of the Proposed Scheme including the creation of slivers of isolated farmland.

9.5.9 There will be a reduction in tranquillity due to the introduction of infrastructure and presence of trains in a predominantly rural area.

9.5.10 Therefore, the magnitude of change is considered to be medium in year one of operation.

9.5.11 The medium magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a moderate adverse effect in year one of operation.

9.5.12 By year 15 of operation, planting will have established, aiding the integration of the Proposed Scheme into the rural landscape. However, the high speed trains, noise barriers, scale and elevation of the Drayton Bassett viaduct and approach embankments will continue to be at variance with the tranquillity and character of the local landscape. Therefore, the magnitude of change will remain as medium giving rise to a moderate adverse effect in year 15 of operation.

9.5.13 By year 60 of operation, the maturity of planting will further integrate the Proposed Scheme into the landscape resulting in effects becoming non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Sandstone Hills and Heaths LCA

9.5.14 The Proposed Scheme will pass through this LCA largely in cutting of up to 14.8m below, and also on embankment of typically 3 to 4m above, ground level. South of Watling Street it will be on a viaduct with the track level up to 6.7m above ground level. Landscape impacts of the Proposed Scheme will include:

- engineered embankments and deep cuttings resulting in substantial changes to existing landform and an extensive loss of woodland cover including ancient woodland;
- introduction of a major infrastructure route into a largely secluded and well screened rural area rural area, reducing the existing high level of tranquillity;
- introduction of a viaduct (Black Brook viaduct) of up to 6.7m high, crossing a small-scale valley;
- introduction of noise fence barriers as a distinct linear feature, contrasting with the undulating agricultural landscape; and
- changes to the pattern, structure and maturity of landscape features, including replacement of trees and woodland with new mixed native woodland planting following the reinstatement of agricultural land.

9.5.15 There will be a substantial reduction in tranquillity of the LCA due to the introduction of high speed trains into an area of generally limited infrastructure. Therefore, due to these changes in the character of the area, the magnitude of change is considered to be high in year one of operation.

9.5.16 The high magnitude of change, assessed alongside the high sensitivity of the character area, will result in a major adverse effect in year one of operation.

9.5.17 By year 15 of operation, planting will have established, aiding the Proposed Scheme's integration into the rural landscape. However, the scale and extent of the route, earthworks, overhead line equipment and high speed trains will remain at variance with the tranquillity and character of the local landscape. Therefore, the magnitude of change is considered to be medium.

9.5.18 The medium magnitude of change, assessed alongside the high sensitivity of the character area, will result in a moderate adverse effect in year 15 of operation.

9.5.19 By year 60 of operation, proposed planting will be mature and integrated into the surrounding landscape. However, alterations to the landscape character of landform changes, a viaduct and reduced tranquillity will persist in altering the landscape character. Therefore, the magnitude of change is considered to remain medium, meaning the overall effect will be unchanged for year 60 of operation.

### Sandstone Estatelands LCA

9.5.20 The Proposed Scheme will pass through this LCA largely in a deep cutting, typically in excess of 11m above ground level, and at ground level from the junction of Flats Lane and Knox's Grave Lane, for approximately 600m. Landscape impacts of the Proposed Scheme will include:

- a deep cutting crossing the existing sloping sandstone landform between Black-Bourne Brook valley and Whittington Heath;
- introduction of a major infrastructure route into a largely well vegetated rural area, reducing tranquillity;
- substantial changes to the local road network, including at Drayton Lane, Bangley Lane and Flats Lane;
- introduction of noise barriers and security fences as distinct linear features, contrasting with the rural landscape; and
- changes to the pattern, structure and maturity of landscape features, including replacement of trees and woodland with new mixed native woodland planting following the reinstatement of agricultural land.

9.5.21 There will be a reduction in tranquillity of the LCA due to the presence of high speed trains into a predominantly rural area, adding to the existing influence of busy main roads. Therefore, due to the extent of these changes in the character of the area, the magnitude of change is considered to be medium in year one of operation.

9.5.22 The medium magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a moderate adverse effect in year one of operation.

9.5.23 By year 15 and beyond to year 60 of operation, proposed planting will have established and matured sufficiently to achieve a greater degree of landscape integration of the Proposed Scheme into the rural landscape. However, the prominent changes to the landform of the area will remain. Therefore, the magnitude of change is considered to remain medium, meaning the overall moderate adverse effect will be unchanged for year 15 and beyond to year 60 of operation.

#### *Visual assessment*

9.5.24 This section describes the significant effects on visual receptors during year one, year 15 and year 60 of operation. Non-significant effects on visual receptors are presented in Volume 5: Appendix LV-001-021, Part 4.

9.5.25 For each viewpoint the following assessments have been undertaken:

- effects during winter of year one of operation;
- effects during summer of year one of operation;
- effects during summer of year 15 of operation; and
- effects during summer of year 60 of operation.

9.5.26 Where significant effects have been identified, an assessment of effects at night-time arising from additional lighting has also been undertaken.

9.5.27 The number identifies the viewpoint locations which are shown in Volume 2: CFA21 Map Book, Maps LV-04-088 to LV-04-091. In each case, the middle number (xxx.X.xxx) identifies the type of receptor that is present in this area – 2: Residential, 3: Recreational, 4: Transport.

9.5.28 Where a viewpoint may represent multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity may be lower than those reported.

### Viewpoint 330.3.002: View west from PRoW Drayton Bassett Footpath 13, between Drayton Bassett and Middleton

9.5.29 The Proposed Scheme will be visible beyond arable land, on embankment at Trickley Coppice in the middle ground. Due to the elevation and scale of the Proposed Scheme, the magnitude of change is considered to be medium.

9.5.30 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.31 In summer of year one of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.32 By year 15 of operation, although proposed planting east of Trickley Coppice embankment will have established to provide some screening; upper elements of the route on embankment including overhead line equipment and train movements will remain visible. However, the medium magnitude of change will reduce to a moderate adverse effect in the summer of year 15 of operation.

9.5.33 By year 60 of operation, the maturity of the proposed planting will substantially screen the Proposed Scheme, reducing effects to non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 330.2.003 and 332.3.002: Views south-west from The Pump House at Brook Farm and from the Heart of England Way on Drayton Lane

9.5.34 From these locations, Drayton Bassett viaduct (up to 5.8m above ground level) and embankments to the north and south will be visible in the middle ground. Proposed planting will not be sufficiently established to screen taller elements including the viaduct and noise fence barrier, overhead line equipment and train movements. Therefore, the magnitude of change is considered to be medium.

9.5.35 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.36 In summer of year 1 of operation, although intervening hedgerow vegetation will afford a greater level of screening in the foreground and middle ground, overall effects will be unchanged.

9.5.37 By year 15 and beyond to year 60 of operation, the maturing planting will provide screening to the Proposed Scheme embankments and the lower elements of overhead line equipment and train movements, although these will remain visible on Drayton Bassett viaduct. Therefore the effects on these viewpoints will reduce to non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 331.3.003: View north-east from PRoW Drayton Bassett Footpath 9, near Shirall Hall Farm

9.5.38 The upper elements of overhead line equipment within Drayton Lane cutting will be visible in the middle ground, as will the embankments of the realigned Drayton Lane and overbridge and Shirrall Drive. The A453 Sutton Road overbridge will be seen through intervening vegetation in the background further north. Therefore, the magnitude of change is considered to be low.

9.5.39 The low magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.40 In summer of year one of operation, whilst existing trees, woodland and hedgerows will provide some additional screening, the magnitude of change is considered to remain low meaning the overall effect will be unchanged.

9.5.41 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will provide additional screening of the Proposed Scheme, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 332.2.005: View to the south from Oak Farm, Drayton Lane/ The Heart of England Way

9.5.42 The Drayton Bassett viaduct with noise barrier fences, overhead line equipment and train movements will be visible in the background of this view. Drayton Lane auto-transformer station and the adjacent balancing pond and access road will be visible through intervening field boundary vegetation. Therefore, the magnitude of change is considered to be medium.

9.5.43 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.44 In summer of year one of operation, effects will be unchanged due to the low height of the proposed planting located to the east of the route.

9.5.45 By year 15 and beyond to year 60 of operation, the proposed planting to the east of the Drayton Lane embankment will be established, integrating the route into the local landscape setting, although views of the Drayton Bassett viaduct with noise barriers, overhead line equipment and train movements will remain. Therefore, effects will be unchanged.

### Viewpoints 333.2.002, 333.3.006 and 333.3.007: Views to the north-east from Drayton Lane (on the Heart of England Way) including Draytonlane End Farm (off the A453 Sutton Road), and formerly adjacent to Barn Cottage, Lone Oak and Cranebrook

9.5.46 The Drayton Lane cutting and Drayton Lane overbridge will be visible, in the foreground of these views, with the visibility of the upper elements of overhead line equipment and trains movements dependent on the cutting depth. The gap in mature roadside trees along the A453 Sutton Road across the route will remain evident. Therefore, the magnitude of change is considered to be high.

9.5.47 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects in winter of year one of operation.

9.5.48 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.49 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will mean effects on these viewpoints will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 333.3.004: View from PRoW Drayton Bassett 12 (on the Heart of England Way), at Bangley Lane

9.5.50 Views will extend over the Proposed Scheme in cutting north of the A453 Sutton Road overbridge, to Drayton Basset Footpath 11 overbridge and the Bangley Lane (Hints Bridleway 20) accommodation overbridge. The upper sections of overhead line equipment and train movements will be visible, partially screened by intervening garden and field hedges and trees and by buildings at Great Bangley Farm. Therefore, the magnitude of change is considered to be medium. The view of the Proposed Scheme in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-136 (Volume 2: CFA21 Map Book).

9.5.51 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.52 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.53 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will mean effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 333.3.005: View to the east from PRoW Drayton Bassett Footpath 11, near Great Bangley Farm

9.5.54 The Drayton Lane cutting and the Drayton Basset Footpath 11 overbridge will be visible in the immediate foreground, with the upper sections of overhead line equipment and trains visible. Therefore, the magnitude of change is considered to be medium.

9.5.55 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.56 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.57 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will mean effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 334.3.001: View north-west from Drayton Lane (part of the Heart of England Way)

9.5.58 The realigned Drayton Lane on overbridge and embankments will be prominent in the foreground of this view. Visible in middle ground of the view will be the upper

elements of overhead line equipment and train movements in the cutting north of Drayton viaduct, with the extent of visibility dependant on the cutting depth. Therefore, the magnitude of change is considered to be high.

9.5.59 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.60 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.61 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will mean effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 334.2.002: View south-west adjacent to Hill Farm and Bourne Croft

9.5.62 The A453 Sutton Road overbridge over the Drayton Lane cutting will be visible in the middle ground, with the visibility of the upper elements of overhead line equipment and train movements seen beyond intervening field boundaries and linear woodland. Therefore, the magnitude of change is considered to be low.

9.5.63 The low magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.64 In summer of year 1 of operation, existing intervening field boundary and woodland vegetation will provide increased screening of the Proposed Scheme, resulting in effects on this viewpoint for summer, and for yeas 15 and beyond to year 60 of operation becoming non-significant. These are reported in Volume 5: Appendix LV-001-021 Part 4.

### Viewpoint 334.3.003: View west from PRoW Drayton Bassett Footpath 11, off Sutton Road, close to the property Oakleigh

9.5.65 The Proposed Scheme will be in cutting north of the A453 Sutton Road overbridge towards Bangley Lane with environmental earthworks east of the route visible in the middle ground, seen beyond intervening field hedgerows. The upper elements of overhead line equipment will be visible. Therefore, the magnitude of change is considered to be medium. The view of the Proposed Scheme in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-138 (Volume 2: CFA21 Map Book).

9.5.66 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.67 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.68 By year 15 and beyond to year 60 of operation, maturity of the proposed planting will provide additional screening, meaning effects on these viewpoints will be non-significant. These are reported in Volume 5: Appendix LV-001-021 Part 4.

### Viewpoints 335.3.001 and 335.2.002: Views north-east from PRoW Hints Footpath 20,) (on the Heart of England Way), Bangley Lane and Hints Farm complex (Hints Farm House, Flaad House, Hallsdean and The Hayloft)

9.5.69 Bangley Lane (Hints Bridleway 20) accommodation overbridge and northwards along a low section of the Hints embankment, with overhead line equipment and train movements will be visible in the middle ground, filtered by intervening laneside and field boundary vegetation. Therefore, the magnitude of change is considered to be medium.

9.5.70 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.71 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.72 By year 15 and beyond to year 60 of operation, maturity of the proposed planting will provide additional screening, meaning effects on these viewpoints will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 335.3.003: View east from PRoW Hints Footpath 15(a) (on the Heart of England Way)

9.5.73 The route north and south of Bangley Lane (Hints Bridleway 20) accommodation overbridge will be visible in the middle ground of the view, filtered by intervening field boundary vegetation. The upper elements of overhead line equipment and train movements will be visible. Therefore, the magnitude of change is considered to be medium.

9.5.74 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.75 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.76 By year 15 and beyond to year 60 of operation, planting maturity will provide more effective screening, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 335.2.004, 337.2.002 and 337.2.004: Views north-east from Brockhurst Farm, from Brockhurst Lane adjacent to White Owl Farm, and east from the Heart of England Way near Rookery Farm

9.5.77 A short length of the Proposed Scheme in deep cutting passing west of Hints will be visible in the middle ground of the view, with the west-facing slope of the cutting at Roundhill Wood noticeable. Hints Footpath 14 green overbridge will also be visible. Therefore, the magnitude of change is considered to be medium.

9.5.78 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.79 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.80 By year 15 of operation, the proposed planting on the west of Hints cutting will be established and integrated with the pattern of existing vegetation, however, the upper faces of the Roundhill Wood cutting will remain visible. Therefore, the effects will be unchanged.

9.5.81 By year 60 of operation, maturity of the proposed planting will screen the Proposed Scheme, meaning effects on these viewpoints will reduce to be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 336.2.001, 336.2.002 and 336.2.003: Views south-west from Orchard Farm, Bangley Lane, Lower Bangley on Bangley Lane and from PRoW Hints Footpath 20, near Fordway Farm

9.5.82 There will be foreground and middle ground views of Bangley Lane (Hints Bridleway 20) accommodation overbridge and taller elements of overhead line equipment and train movements within the shallow cutting north of the A453 Sutton Road. Drayton Lane Bassett Footpath 11 overbridge will be noticeable beyond intervening farm buildings and field boundaries and Bangley Lane (Hints Bridleway 20) accommodation overbridge will be visible. Therefore, the magnitude of change is considered to be medium.

9.5.83 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.84 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.85 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on these viewpoints will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 336.2.006: View south-west from Holt Farm/The Old Barn

9.5.86 The Proposed Scheme will be visible in the foreground, in shallow cutting north of Bangley Lane (Hints Bridleway 20) accommodation overbridge and then north towards Hints Footpath 9 underpass, where the route will be on low embankment. The Hints embankment will partially screen views to the wider landscape beyond, therefore, the magnitude of change is considered to be high.

9.5.87 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.88 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.89 By year 15 and beyond to year 60 of operation, the proposed planting on the eastern slopes of Hints embankment will be established providing some screening, however the upper elements of the embankment, overhead line equipment and train movements will remain visible. Therefore, the magnitude of change will reduce to medium, giving rise to a moderate adverse effect in the summer of years 15 and 60 of operation.

### Viewpoint 338.3.001: View south-west from PRoW Hints Footpath 13, off Brockhurst Lane

9.5.90 The Proposed Scheme will be visible in the foreground of the view in cutting south of Brockhurst Lane underbridge and emerging from the cutting and passing onto Milditch Wood embankment, with Rookery Wood seen beyond in the middle ground. The loss of woodland at the edge of Rookery will be marked; therefore, the magnitude of change is considered to be high.

9.5.91 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.92 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.93 By year 15 of operation, planting east of Milditch Wood embankment will be established, screening views of security fencing, overhead line equipment and train movements. The planting will also soften and integrate embankments and false cutting into the local landscape pattern. Therefore, the magnitude of change is medium, giving rise to a moderate adverse effect in the summer of year 15 of operation.

9.5.94 By year 60 of operation, the further growth and maturity of the proposed planting will provide additional screening, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 338.2.002: View south-west from the edge of Hints

9.5.95 The Proposed Scheme will be located in cutting in the middle ground of the view. Hints Footpath 14 green overbridge will be prominent in the centre of the view and the changes to the shape of Roundhill Wood will also be apparent. Depending on the depth of the cutting, some sections of the upper elements of overhead line equipment will be visible. Therefore, the magnitude of change is considered to be high.

9.5.96 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.97 In summer of year 1 of operation, although the vegetation along Black Brook will be in leaf and provide some additional screening, the effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.98 By year 15 and beyond to year 60 of operation, the maturity of the proposed planting will provide additional screening of the Proposed Scheme, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 338.3.003, 340.2.002 and 340.3.005: Views south-west from PRoW Hints Footpath 6, near Home Farm, from Watling Street and from PRoW Hints Footpath 1(a),to the rear of properties at Watling Street, Hints

9.5.99 The Proposed Scheme will be visible in the middle ground across a broad arc of view. Changes to the outline of Rookery Wood will be noticeable, with Milditch Wood embankment visible as the route emerges from cutting to pass east of Job's Hill. Hints footpath 14 green overbridge will be visible in the middle of the view between

Roundhill and Rookery woods. Hints Footpath 9 underpass will also be visible in the middle ground. Therefore, the magnitude of change is considered to be medium. The view of the Proposed Scheme from viewpoint 338.3.003, in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-142 (Volume 2: CFA21 Map Book).

9.5.100 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.101 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.102 By year 15 and beyond to year 60 of operation, the maturity of planting to east and west of the Milditch Wood embankment and Hints cutting will provide additional screening of the Proposed Scheme, meaning effects on these viewpoints will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 338.2.004 and 338.2.005: Views south-west from Bangley Lodge Farm and from property on Watling Street, Hints

9.5.103 The Proposed Scheme will be visible crossing the middle ground of this view, beyond the Black Brook valley on low embankment and deep cutting through a landscape of low rounded hills. Views will include the Hints embankment before the Proposed Scheme passes into cutting to the west of Roundhill Wood. North of Roundhill, Hints Footpath 14 green overbridge will be visible as will the upper elements of overhead line equipment and train movements north of the overbridge. The altered outline of Rookery Wood will be visible beyond the Proposed Scheme in the middle ground. Therefore, the magnitude of change is considered to be low.

9.5.104 The low magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.105 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.106 By year 15 and beyond to year 60 of operation, planting established as part of the Proposed Scheme will have matured, reducing the effects to non-significant. These are reported in Volume 5: Appendix LV-001-022.4.

### Viewpoints 339.3.001 and 340.2.003: Views to the east from PRoW Hints 5, (on the Heart of England Way) near Bourne House and south-west from 'The Lodge'

9.5.107 For both viewpoints the Black Brook viaduct will be visible in the foreground, above balancing ponds located on the north of the Black Brook valley. To the south, Milditch Wood embankment will be visible in middle ground. Overhead line equipment and train movements will be visible on the viaduct and on the embankment. Therefore, the magnitude of change is considered to be high.

9.5.108 The high magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects in winter of year one of operation.

9.5.109 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.110 By year 15 and beyond to year 60 of operation, planting established on the embankments and around the balancing ponds will have matured, partially screening views to the route. However, views along the Black Brook to the viaduct, noise barrier fences, and the upper elements of overhead line equipment and train movements in the foreground will remain. Therefore, the magnitude of change is considered to remain high, meaning the overall effect will be unchanged.

### Viewpoint 339.3.002: View to the north from PRoW Hints Footpath 5 (on the Heart of England Way), near Job's Hill

9.5.111 The Black Brook viaduct will be visible in the middle ground of this view, with a balancing pond seen west of the brook in the valley below. Overhead line equipment and train movements will be visible entering into/emerging from Swinfen cutting north of the brook and passing beneath Watling Street overbridge in the background. Compensation woodland planting to the east of Milditch Wood will be visible in the foreground of the view. Therefore, the magnitude of change is considered to be high. The view of the Proposed Scheme in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-143 (Volume 2: CFA21 Map Book).

9.5.112 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.113 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.114 By year 15 and beyond to year 60 of operation, the proposed planting to the balancing ponds, along Swinfen cutting and east of Milditch Wood adjoining the Heart of England Way, will be established, softening and partially screening views to the Proposed Scheme beyond. However, views into Swinfen cutting will remain, as will the visibility of overhead line equipment and train movements on Black Brook viaduct. Therefore, the magnitude of change will reduce to medium, giving rise to a moderate adverse effect in the summer of years 15 and 60 of operation. The view of the Proposed Scheme in the summer of year 15 of operation is illustrated on the photomontage shown in Figure LV-01-255 (Volume 2: CFA21 Map Book).

### Viewpoint 340.3.001: View west from PRoW Hints Footpath 0.378, near Black Brook in Hints

9.5.115 Milditch Wood embankment and Black Brook viaduct will be visible in the middle ground of this view, seen between and beyond vegetation along the Black Brook valley in the foreground. Noise barrier fences, overhead line equipment and train movements will be visible on the viaduct. Therefore, the magnitude of change is considered to be medium.

9.5.116 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.117 In summer of year one of operation, visibility will be largely filtered by mature trees along Black Brook. Therefore, the magnitude of change will be low. The low magnitude of change, assessed alongside the high sensitivity of the receptor will

result in reducing the effects in the summer of year 1 to non-significant. These effects will remain for year 15 and beyond to year 60 of operation. These are reported in Volume 5: Appendix LV-001-022.4.

### Viewpoint 341.2.001: View north-east from properties on Watling Street (23 Watling Street)

9.5.118 The A5 (Weeford-Fazeley improvement) overbridge and the A5 Watling Street overbridge will both be visible crossing over Swinfen cutting in the middle ground, filtered by garden and roadside vegetation in the foreground. Therefore, the magnitude of change is considered to be high.

9.5.119 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.120 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.121 By year 15 and beyond to year 60 of operation the growth and maturity of the proposed planting will reduce effects on this viewpoint to non-significant. These are reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 341.2.002 and 341.2.008: Views north-east from residential properties on Flats Lane

9.5.122 There will be open views across arable land to Swinfen cutting, crossing the middle ground, with the cutting depth screening views of overhead line equipment and train movements. Also visible in the middle ground of the view will be security fencing along the top of the cutting. Flats Lane overbridge will be visible in the background. Therefore, the magnitude of change is considered to be medium. The view of the Proposed Scheme from viewpoint 341.2.008 in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-144 (Volume 2: CFA21 Map Book).

9.5.123 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in major adverse effects in winter of year one of operation.

9.5.124 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.125 By year 15 and beyond to year 60 of operation, further growth and maturity of the planting will provide substantial screening of the route, resulting in non-significant effects on these viewpoints. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 341.4.007: View north-east from Flats Lane on overbridge across the A5

9.5.126 There will be views along the A5 Trunk Road (Weeford-Fazeley improvement) to the overbridge crossing the Proposed Scheme in the middle ground. The upper elements of Flats Lane auto-transformer station will be visible in the middle ground. In the foreground, areas of compensation planting on the slopes of the A5 cutting will be visible. There will be a narrow view into the Swinfen cutting as it passes beneath the A5, (Weeford to Fazeley) Improvement overbridge in the middle ground, with the

upper elements of overhead line equipment and train movements visible. Therefore, the magnitude of change is considered to be medium.

9.5.127 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation. The view of the Proposed Scheme in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-145 (Volume 2: CFA21 Map Book).

9.5.128 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.129 By year 15 and beyond to year 60 of operation, growth and maturity of the proposed planting will provide additional screening of the route, resulting in effects on this viewpoint being non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 342.2.001: View north-west from Buck's Head Cottages

9.5.130 The Proposed Scheme will cross a broad arc of the middle ground of the view, within the Swinfen cutting concealing overhead line equipment and train movements. The Flats Lane will be visible seen beyond intervening field boundaries. Therefore, the magnitude of change is considered to be medium.

9.5.131 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.132 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.133 By year 15 and beyond to year 60 of operation, the growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 342.3.002: View to the north-west from PRoW Hints Footpath 4 (on the Heart of England Way PRoW) near Buck's Head Farm

9.5.134 Swinfen cutting will be visible in the foreground of the view, with the security fencing at the top of cutting slopes noticeable. Flats Lane auto-transformer station located west of the route will be also be visible in the foreground. Overhead line equipment and train movements will not be seen due to the depth of the cutting. Therefore, the magnitude of change is considered to be medium.

9.5.135 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse effect in winter of year one of operation.

9.5.136 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.137 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 343.3.001: View east from Tamworth Lane PRoW Swinfen and Packington Footpath 5

9.5.138 Swinfen cutting will be visible in the middle ground of the view, seen beyond intervening field boundary hedges. The cutting will extend north to break the ridgeline in the background of the view, close to Horsley Brook Farm. Therefore, the magnitude of change is considered to be medium.

9.5.139 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.140 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.141 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 343.3.005: View north-east from PRoW(Swinfen and Packington Footpath/Bridleway 50n Swinfen Lane

9.5.142 Swinfen cutting will be visible in the middle ground across a wide arc, with the route cutting into the ridgeline close to Horsley Brook Farm prominent in the background of the view. Woods at Mascote Covert located in the middle ground and the more distant Moor Covert will provide some screening. Therefore, the magnitude of change is considered to be medium.

9.5.143 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.144 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.145 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoints 344.3.001 and 344.3.002: View west from the junction of PRoW Swinfen and Packington Footpath 6 (part of the Heart of England Way) on Knox's Grave Lane and north-west from PRoW Swinfen and Packington Footpath 6 (on the Heart of England Way near Packington Moor)

9.5.146 Swinfen cutting will be visible in the middle ground as it crosses this area in shallow cutting north of Flats Lane, where overhead line equipment and train movements will be visible, to deep cutting north of Packington Moor Farm in which they will be concealed. The realigned Knox's Grave Lane/Flats Lane and overbridge will also be visible in the middle ground. Therefore, the magnitude of change is considered to be medium. The view of the Proposed Scheme from viewpoint 344.3.002 in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-148 (Volume 2: CFA21 Map Book).

9.5.147 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in moderate adverse effects in winter of year one of operation.

9.5.148 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.149 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on these viewpoints will be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

9.5.150 Viewpoint 344.4.003: View west from the junction of Jerry's Lane with the access track leading to Packington Farm and from future employment and recreational receptors at Packington Moor Farm. The Proposed Scheme will be visible in a shallow section of Swinfen cutting in the middle ground of the view. Overhead line equipment and train movements will be visible. Therefore, the magnitude of change is considered to be medium.

9.5.151 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor at 344.4.003, will result in a moderate adverse effect in winter of year one of operation. The same magnitude of change assessed alongside the low sensitivity for a future employment receptor will also result in a moderate adverse effect due to proximity to the route. However, for a future recreational receptor at Packington Moor Farm, a medium magnitude of change will result in major adverse effects due to the proximity of the route.

9.5.152 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.153 By year 15 and beyond to year 60 of operation, the further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint and on the future viewpoints at Packington Moor Farm will reduce to be non-significant. This is reported in Volume 5: Appendix LV-001-021, Part 4.

### Viewpoint 345.3.001: View north-east from PRoW Swinfen and Packington Footpath8 (on the Heart of England Way), near Horsley Brook Farm and future residential receptors at Horsley Brook Farm

9.5.154 Swinfen cutting will be visible in the foreground of this view, with the visibility of the Proposed Scheme continuing into the middle ground and background. The upper elements of overhead line equipment and train movements will be visible, as will the line of security fencing at the top of the cutting, and a new farm access track parallel to the west of the route. Therefore, the magnitude of change is considered to be high.

9.5.155 The high magnitude of change, assessed alongside the high sensitivity of the receptor and of future residential receptors at Horsley Brook Farm, will result in a major adverse effect in winter of year one of operation.

9.5.156 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.157 By year 15 of operation, the proposed planting west of the route will be established screening the top of the cutting and views of overhead line equipment and train

movements, however, the planting will also screen views across the wider landscape. Therefore, the magnitude of change is medium giving rise to a moderate adverse effect in the summer of year 15 of operation.

9.5.158 By year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021 Part 4.

### Viewpoints 345.3.002 and 345.3.004: Views east and south east from PRoW Swinfen and Packington Footpath 8 (on the Heart of England Way), near Ingleyhill Farm

9.5.159 Fencing marking the line of Swinfen cutting will be visible crossing the middle ground and background, with the upper elements of overhead line equipment and train movements visible. There will be a view into the cutting at the Horsley Brook green overbridge. Therefore, the magnitude of change is considered to be medium. The view of the Proposed Scheme from viewpoint 345.3.004 in the winter of year one of operation is illustrated on the photomontage shown in Figure LV-01-149 (Volume 2: Map Book CFA21).

9.5.160 The medium magnitude of change, assessed alongside the high sensitivity of these receptors, will result in a moderate adverse effect in winter of year one of operation.

9.5.161 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.162 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on these viewpoints will be non-significant. This is reported in Volume 5: Appendix LV-001-021 Part 4.

### Viewpoint 346.2.001: View south-west from Broadfields (Packington House) on Jerry's Lane

9.5.163 A shallow section of Swinfen cutting will be visible in the middle ground of the view, with overhead line equipment and train movements extending south to Flats Lane overbridge, visible on the left of the view. Therefore, the magnitude of change is considered to be medium.

9.5.164 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.165 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.166 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will provide additional screening of the route, meaning effects on this viewpoint will be non-significant. This is reported in Volume 5: Appendix LV-001-021 Part 4.

### Viewpoint 347.2.001: View east from Forest House adjoining PRoW Swinfen and Packington 8 (on the Heart of England Way)

9.5.167 From this viewpoint, Swinfen cutting will be visible in the middle ground and background. The upper elements of overhead line equipment and train movements will be visible. Security fencing at the top of the cutting, and a farm access track parallel west of the route will be seen. There will also be oblique views of the A51 Tamworth Road overbridge across the route in the background. Therefore, the magnitude of change is considered to be medium.

9.5.168 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in winter of year one of operation.

9.5.169 In summer of year 1 of operation, effects will be unchanged due to the low growth achieved by the proposed planting.

9.5.170 By year 15 and beyond to year 60 of operation, further growth and maturity of the proposed planting will not provide additional screening of the Proposed Scheme. Therefore, the magnitude of change is considered to remain medium, meaning the overall effect will be unchanged.

### *Cumulative effects*

9.5.171 Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the baseline for the operation of the Proposed Scheme. The committed development described in Volume 5: Map Book Cross Topic Maps, Maps CT-004-000/1 and CT-004-000/2 will all be completed by 2017, and therefore will not contribute to cumulative effects on landscape or views.

9.5.172 There are no known developments which are assumed to be under construction at the same time as the Proposed Scheme, and therefore there are no consequential cumulative effects on the LCA and viewpoints.

## Other mitigation measures

9.5.173 The permanent effects of the Proposed Scheme on landscape and visual receptors have been substantially reduced through incorporation of the measures described previously. Effects in year 1 of operation may be further reduced by establishing planting early in the construction programme, which will be considered during the detail design stage. This would provide additional screening and greater integration of the Proposed Scheme into the landscape. However, no other mitigation measures are considered practicable due to the high visibility of elements of the Proposed Scheme and the sensitivity of the surrounding receptors.

## Summary of likely residual significant effects

9.5.174 In most cases, significant effects will reduce over time as the proposed mitigation planting matures and reaches its designed intention. However, the following significant residual effects will remain following year 15 of operation:

- adverse effects on the character of the Lowland Village Farmlands LCA due to the influence of the engineered landforms and viaducts on the rural landscape;

- adverse effects on the character of the Sandstone Hills and Heaths LCA due to the influence of the engineered landforms and viaducts on the rural landscape;
- adverse effects on views from residential receptors at Oak Farm, Drayton Lane/The Heart of England Way (332.2.005); at Brockhurst Farm (335.2.004), White Owl Farm (337.2.002) and near to Rookery Farm (337.2.004) arising from the impacts of the Proposed Scheme crossing a rolling rural landscape on embankments and in cutting;
- adverse effects on views from residential receptors at Holt Farm/The Old Barn (336.2.006) arising from the impact of the Proposed Scheme on Hints embankment;
- adverse effects on views from residential receptor at 'The Lodge' (340.2.003); arising from the proximity to the Proposed Scheme at Black Brook viaduct and Milditch Wood embankment; and
- adverse effects on views from users of PRoW across parts of the study area, arising from the visibility of different elements of the Proposed Scheme, including embankments and viaducts, cuttings, overbridges, trains, fencing, noise fence barriers and overhead line equipment. These will occur from Drayton Bassett Footpath 13 between Drayton Bassett and Middleton (330.3.002), from Hints Footpath 13, off Brockhurst Lane (338.3.001); and also from locations on the Heart of England Way on Hints Footpath 5 near Bourne House (339.3.001) and at Job's Hill (339.3.002), and on Swinfen and Packington Footpath 8, near Horsley Brook Farm (345.3.001).

# 10 Socio-economics

## 10.1 Introduction

10.1.1 The section reports the likely significant economic and employment effects during the construction and operation of the Proposed Scheme.

10.1.2 The need for a socio-economic assessment results from the potential for the Proposed Scheme to affect:

- existing businesses and community organisations and thus the amount of local employment;
- local economies, including employment; and
- planned growth and development.

10.1.3 The beneficial and adverse socio-economic effects of the Proposed Scheme are reported at two different levels: route-wide; and CFA. Effects on levels of employment are reported at a route-wide level within Volume 3. Localised effects on businesses and observations on potential local economic effects are reported within each CFA report.

### Construction

10.1.4 The proposed construction works will have the following relevance in terms of socio-economics:

- premises demolished with their occupants and employees needing to relocate to allow for construction of the Proposed Scheme; and
- potential employment opportunities arising from construction in the local area (including in adjacent CFA).

### Operation

10.1.5 The operation of the Proposed Scheme will have relevance in terms of socio-economics, in relation to the potential employment opportunities created by new business opportunities.

## 10.2 Scope, assumptions and limitations

10.2.1 The assessment scope, key assumptions and limitations for the socio-economics assessment are set out in Volume 1, the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

10.2.2 There have been no variations to the socio-economic assessment methodology arising from engagement with stakeholders and community organisations.

# 10.3 Environmental baseline

## Existing baseline

### *Study area description*

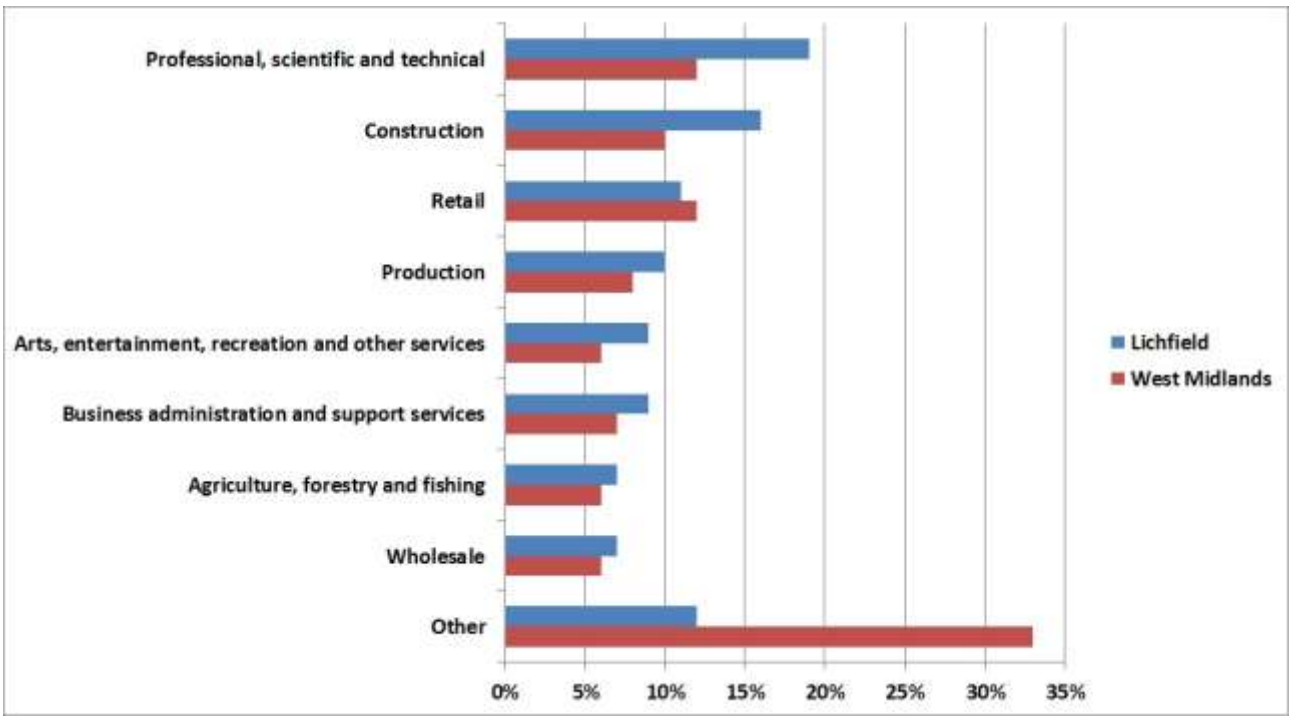
10.3.1 Section 2.1 of this report provides a general overview of the Drayton Bassett, Hints and Weeford area which includes data of specific relevance to socio-economics notably demographic and employment data. The following provides a brief overview in terms of employment, economic structure and labour market[43].

10.3.2 The area lies wholly within the area covered by LDC. Due to the rural nature of the area, district statistics have been used to provide some baseline context for the area.

### *Business and labour market*

10.3.3 Within the district there is a range of business types reflecting a wide spread of commercial services. The largest business sector in LDC in 2011 was professional, scientific and technical services which accounts for a larger proportion (at 19%) of businesses than the West Midlands region average (12%) and the English average (14%).The district also has a higher proportion of construction sector businesses than is typical (at 16% compared to 10%) in the region[44]. This is shown in Figure 6[45].

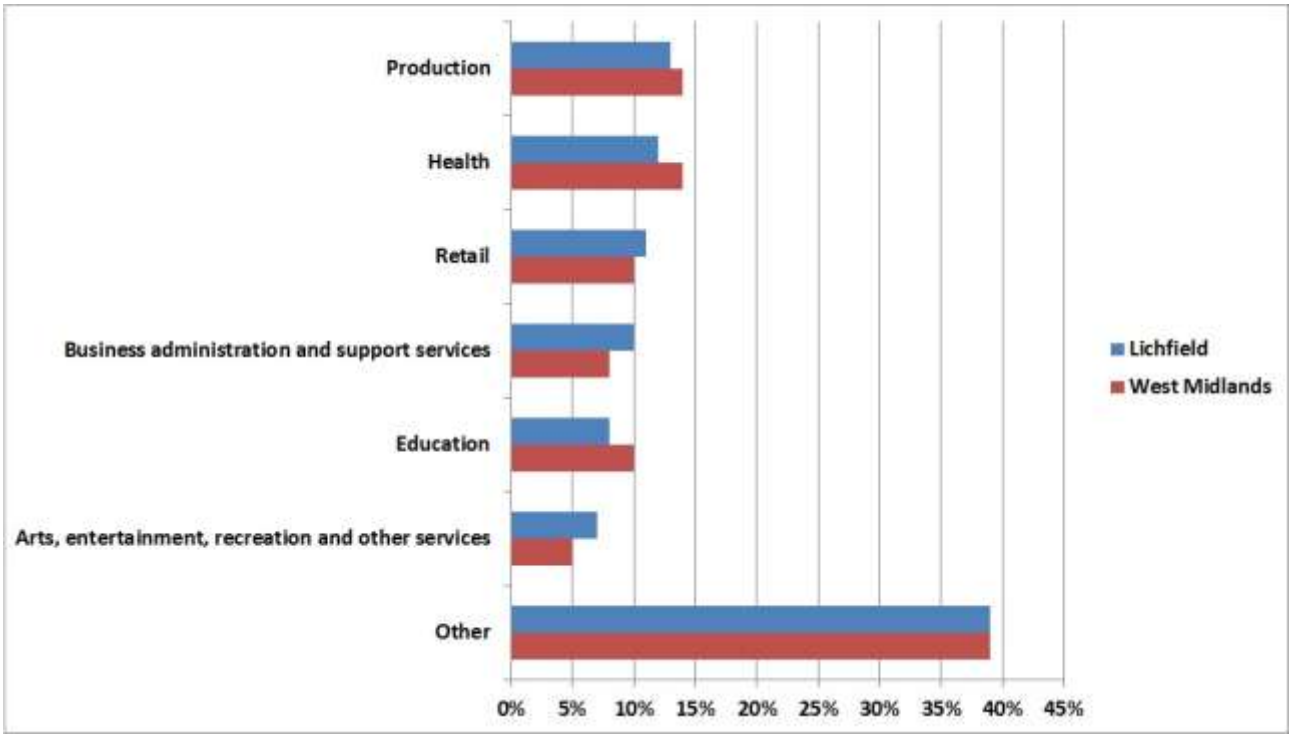
Figure 6: Business sector composition in Lichfield District Council and West Midlands[46] [47]




[43] Further information on the socio-economics baseline within the area including a business and labour market profile (Volume 5: Appendix SE-001-000).
[44] Office for National Statistics (ONS) (2012), *UK Business: Activity, Size and Location 2011*, ONS, London. Please note 2011 data has been used to provide an appropriate comparison with 2011 Census data.
[45] Figure 6 presents the proportion of businesses within each business sector in the borough but not the proportion of employment by sector.
[46] 'Other' includes motor trades; transport & storage; finance & insurance; property; public administration & defence; education.
[47] ONS (2012), *UK Business: Activity, Size and Location 2011*, ONS, London.

10.3.4 Approximately 40,000 people worked in LDC[48]. The sectors with the highest proportion of employment in Lichfield were production[49] (13%) and health (12%). For production this is less than the proportion for the West Midlands (14%) and higher than for England (10%) while for health this is lower than the West Midlands average (14%) and the England average (13%). A further key sector for Lichfield was retail which at 11% is higher than the average for the West Midlands and England (both 10%). This is shown in Figure 7.

Figure 7: Employment by industrial sector in Lichfield District Council and West Midlands[50] [51]




10.3.5 According to the 2011 Census[52], the employment rate[53] within the district in 2011 was 66% (49,000 people) which is higher than that recorded for both the West Midlands (62%) and England (65%). The unemployment rate in LDC was 6% which was lower than the rate for the West Midlands (9%) and the average for England (7%).

10.3.6 According to the 2011 Census, 28% of LDC residents aged 16 and over were qualified to National Vocational Qualification Level 4 (NVQ4) and above, compared to 23% in West Midlands and 27% in England, while 22% of these residents had no qualifications, which was lower than that recorded for the West Midlands (27%) and the same as the average for England (23%)[54].

[48] ONS (2012), *Business Register and Employment Survey 2011, ONS, London*. Note – 2011 BRES data has been used to provide an appropriate comparison with 2011 Census data.
[49] Production, as per ONS definition, is comprised of the mining, quarrying and utilities, and manufacturing sectors.
[50] 'Other' includes agriculture, forestry & fishing; motor trades; wholesale; information & communication; finance and insurance; property; and public administration and defence.
[51] ONS (2012), *Business Register and Employment Survey 2011*, ONS, London.
[52] ONS (2012), *Census 2011*, ONS, London.
[53] The proportion of working age (16-74 years) residents that are in employment. Employment comprises of the proportion of total resident population who are 'in employment' and includes full-time students who are employed.
[54] ONS (2012), *Census 2011*, ONS, London.

### *Property*

10.3.7 Average vacancy rate for industrial and warehousing property in LDC in July 2013 has been assessed as 28% based on marketed space against known stock[55]. Overall, this suggests a good availability of alternative accommodation and a good supply of new development land for employment use.

## Future baseline

### *Construction (2017)*

10.3.8 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2017. Based on extant consents and allocations, no material increase in employment due to development is anticipated in the area by 2017. The existing composition and numbers of employers, employees and economic sectors in the area is likely to change over time in ways that cannot be accurately forecast.

### *Operation (2026)*

10.3.9 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2026. There are no consents or allocations in this local area which are expected to accommodate significant additional employment between 2017 and 2026.

# 10.4 Effects arising during construction

## Avoidance and mitigation measures

10.4.1 In order to avoid or minimise the environmental impacts during construction, the Proposed Scheme design includes provisions to maintain access to businesses during the construction phase.

10.4.2 The draft CoCP includes a range of provisions that will help mitigate socio-economic effects associated with construction within this local area, including:

- consulting businesses located close to hoardings on the design, materials used and construction of the hoarding, to reduce impacts on access to and visibility of their premises;
- reducing nuisance through sensitive layout of construction sites;
- applying best practicable means (BPM) during construction works to reduce noise (including vibration) at sensitive receptors (including local businesses);
- contractors being required to monitor and manage flood risk and other extreme weather events which may affect socioeconomic resources during construction; and
- site specific traffic management measures including requirements relating to the movement of traffic from business and commercial operators of road vehicles, including goods vehicles.

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

## Assessment of impacts and effects

### *Temporary effects*

#### Change in business amenity value

10.4.3 No non-agricultural businesses[56] have been identified within the area which are expected to experience significant amenity effects as a result of the Proposed Scheme.

#### Isolation

10.4.4 No non-agricultural businesses[57] have been identified within this area which are expected to experience significant isolation effects as a result of the Proposed Scheme.

#### Construction employment

10.4.5 There are plans to locate 16 compounds in the area to support construction activity. The use of these sites could result in the creation of up to 800 person years of construction employment opportunities[58], or approximately 80 full-time equivalent jobs[59], which, depending on skill levels required and the skills of local people, are potentially accessible to residents in the locality and to others living further afield. The impact of the direct construction employment creation has been assessed as part of the route-wide assessment (see Volume 3).

10.4.6 Direct construction employment created by the Proposed Scheme could also lead to opportunities for local businesses to supply the project or to benefit from expenditure of construction workers. The impact of this indirect construction employment creation has been assessed as part of the route-wide assessment (see Volume 3).

#### Cumulative effects

10.4.7 No committed developments have been identified that are considered to interact with the Proposed Scheme.

10.4.8 Cumulative effects arise in relation to the accumulation of individual resource based job displacement/losses on a local labour market. These effects are assessed and reported as part of the route-wide assessment (see Volume 3).

### *Permanent effects*

#### Businesses

10.4.9 Businesses directly affected, i.e. those that lie within land which will be used for the construction of the Proposed Scheme, are reported in groups where possible to form defined resources, based on their location and operational characteristics. A group could contain either one or a number of businesses reflecting the fact that a building may have more than one occupier or that similar businesses/resources are clustered together.

[56] Possible employment loss in agricultural businesses as a result of the Proposed Scheme is being estimated at the route-wide level.
[57] Possible employment loss in agricultural businesses as a result of the Proposed Scheme is being estimated at the route-wide level.
[58] Construction labour is reported in construction person years, where one construction person year represents the work done by one person in a year composed of a standard number of working days.
[59] Based on the convention that 10 employment years is equivalent to one full time equivalent job.

10.4.10 In all, three business accommodation units within the area will be directly impacted by the Proposed Scheme. These consist of a kennel on Drayton Lane, a café, farm shop and wedding venue (Packington Moor Farm) on Jerry's Lane and an industrial unit on the A51 Tamworth Road. However, from an employment perspective, no significant direct effects on non-agricultural employment[60] have been identified within the area.

10.4.11 It is estimated that land required for the Proposed Scheme will result in the displacement or possible loss of approximately 80 jobs[61] within this area. Taking into account the availability of alternative premises and the total employed within the district (approximately 40,000), the displacement or possible loss of jobs is considered to be modest compared to the scale of economic activity and opportunity in the area.

#### *Cumulative effects*

10.4.12 No committed developments have been identified that are considered to interact with the Proposed Scheme.

10.4.13 Cumulative effects arise in relation to the accumulation of individual resource based job displacement/losses on a local labour market. These effects are assessed and reported as part of the route-wide assessment (see Volume 3).

### Other mitigation measures

10.4.14 The above assessment has concluded that there are no significant adverse effects arising during construction in relation to businesses directly affected by the Proposed Scheme.

10.4.15 Businesses displaced by the Proposed Scheme will be fully compensated within the provisions of the National Compensation Code. HS2 Ltd recognises the importance of displaced businesses being able to relocate to new premises and will therefore provide additional support over and above statutory requirements to facilitate this process.

10.4.16 The construction of the Proposed Scheme offers considerable opportunities to businesses and residents along the line of route in terms of supplying goods and services and obtaining employment. HS2 Ltd is committed to providing support to businesses and local residents to facilitate access to procurement and employment opportunities arising from the construction of the Proposed Scheme.

### Summary of likely residual significant effects

10.4.17 There are no residual significant effects identified in this assessment that will arise during construction.

## 10.5 Effects arising during operation

### Avoidance and mitigation measures

10.5.1 No mitigation measures are required during operation within this area.

[60] Possible employment loss in agricultural businesses as a result of the Proposed Scheme is being estimated at the route-wide level.
[61] Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floor space and the Homes and Communities Agency (HCA) Employment Density Guide (2010). The estimate is calculated using standard employment density ratios and estimates of floor areas and may vary significantly from actual employment at the sites.

## Assessment of impacts and effects

### *Resources with direct effects*

10.5.2 There are no resources considered likely to experience significant direct effects during the operational phase of the Proposed Scheme within this area.

### *Change in business amenity*

10.5.3 No non-agricultural businesses have been identified within this area which are expected to experience significant amenity effects as a result of operation of the Proposed Scheme.

### *Operational employment*

10.5.4 Operational employment will be created at locations along the route including stations, train crew facilities and infrastructure/maintenance depots. These are considered unlikely to be accessed by residents of this area.

10.5.5 Direct operational employment created by the Proposed Scheme could lead to indirect employment opportunities for local businesses in terms of potentially supplying the Proposed Scheme or benefiting from expenditure of directly employed workers on goods and services.

10.5.6 The impact of operational employment creation has been assessed as part of the route-wide assessment (see Volume 3).

## Other mitigation measures

10.5.7 The assessment has concluded that operational effects within the area will be either negligible or beneficial and therefore mitigation is not required.

## Summary of likely residual significant effects

10.5.8 There are no residual significant effects identified in this assessment that will arise during operation.

# 11 Sound, noise and vibration

## 11.1 Introduction

11.1.1 This section reports the assessment of the likely noise and vibration significant effects arising from the construction and operation of the Proposed Scheme for the Drayton Bassett, Hints and Weeford area on:

- people, primarily where they live ('residential receptors') in terms of a) individual dwellings and b) on a wider community basis, including any shared community open areas[62]; and
- community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'[63].

11.1.2 The assessment of likely significant effects from noise and vibration on agricultural, community, cultural heritage or ecological receptors and the assessment of tranquillity are presented in Sections 3, 5, 6, 7 and 9 of this report respectively.

11.1.3 In this assessment 'sound' is used to describe the acoustic conditions which people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of community areas is likely to be modified through the introduction of the Proposed Scheme. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

11.1.4 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed Scheme, and/or indirect e.g. resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the Proposed Scheme.

11.1.5 This section sets out the means to avoid or reduce the adverse effects that may occur.

11.1.6 The approaches to assessing sound, noise and vibration and appropriate mitigation are outlined in Volume 1 and scope and methodology are defined in the following documents:

- Scope and Methodology Report (SMR) (Appendix CT-001-000/1); and
- SMR addendum (Appendix CT-001-000/2).

[62] 'Shared community open areas' are those that the emerging National Planning Practice Guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (e.g. park to local green space) that is nearby.

[63] Quiet areas are defined in the Scope and Methodology Report as either Quiet Areas as identified under the Environmental Noise Regulations or are resources which are prized for providing tranquillity (further information is provided in Volume 5: Appendix SV-001-000).

11.1.7 More detailed information and mapping regarding the sound, noise and vibration assessment for Drayton Bassett, Hints and Weeford is available in the relevant appendices in Volume 5:

- sound, noise and vibration, route-wide assumptions and methodology (Appendix SV-001-000);
- sound, noise and vibration baseline (Appendix SV-002-021);
- sound, noise and vibration construction assessment (Appendix SV-003-021);
- sound, noise and vibration operation assessment (Appendix SV-004-021); and
- Map Series SV-01, SV-02, SV-03 and SV-04 (Volume 5: Map Book – Sound, noise and vibration).

## 11.2 Environmental baseline

### Existing baseline

11.2.1 The area is predominantly rural in character, with agriculture and forestry the predominant land uses. It is sparsely populated, with only three small villages and a scattering of isolated farms and dwellings.

11.2.2 The major transportation links which traverse the area are the A51 Tamworth Road, the A5, the A453 Sutton Road and (to the west of the area) the M6 Toll and the A38. Close to these main 'arteries', the sound environment is characterised by the sound of traffic both during the day and night-time periods. Away from the main transportation routes, the sound is characterised by natural sources and agricultural activity.

11.2.3 The villages of Weeford and Hints are located in the mostly rural area between the A5 and the A38. Within the village of Hints, daytime sound levels are typically 45 to 50dB[64] with night-time levels[65] of 35 to 40dB. Within Weeford, due to its greater proximity to the major roads, daytime levels are typically 50 to 55dB, reducing to 45 to 50dB at night. At the edges of the village closer to the A5, daytime levels are typically 65dB, reducing to 60dB at night. The sound environment is characterised by distant road traffic both from the A5, the A38, and sometimes the M6 toll as well as occasional local road traffic, community sound from normal every day residential activities, agricultural sounds during the day and natural sound sources.

11.2.4 Away from the main roads, the sound environment is dominated by natural sound sources. In the agricultural area to the south of Hints, between Rookery Lane and Bangley Lane, the existing baseline sound levels are subjectively low (substantially lower than 50dB daytime and/or 40dB night-time). The acoustic environment here is characterised by little or no appreciable man-made sound. Tranquillity is considered in Section 9 of this report.

11.2.5 In the vicinity of Drayton Bassett, the sound environment is dominated by natural sound sources with contributions from the A453 Sutton Road, which traverses the

[64] Quoted dB values at residential areas refer to the free-field 16 hour daytime (07:00 to 23:00) equivalent continuous sound pressure level, $L_{pAeq,16hr}$.
[65] Night-time sound levels refer to the free-field 8 hour night-time (23:00 to 07:00) equivalent continuous sound pressure level, $L_{pAeq,8hr}$.

study area from north-east to south-west, and Drayton Lane leading into Drayton Bassett. Daytime sound levels in this area are typically 55dB at locations not directly overlooking the busier local roads. At night similar sound sources dominate, but levels typically reduce to around 45dB. At properties close to the A452, daytime sound levels are typically 65dB, dropping to 55 to 60dB at night.

11.2.6 Further information on the existing baseline, including baseline sound levels and baseline monitoring results, is provided for this area in Volume 5: Appendix SV-002-021.

11.2.7 It is likely that the majority of receptors adjacent to the line of route are not currently subject to appreciable vibration[66]. Vibration at all receptors from the Proposed Scheme has therefore been assessed using specific thresholds, below which receptors will not be affected by vibration. Further information is provided in Volume 1, Section 8.

## Future baseline

11.2.8 Without the Proposed Scheme, existing sound levels in this area are likely to increase slowly over time. This is primarily due to road traffic growth. Changes in car technology may offset some of the expected sound level increases due to traffic growth on low speed roads. On higher speed roads[67], tyre sound dominates and hence the expected growth in traffic is likely to continue to increase ambient sound levels.

### *Construction (2017)*

11.2.9 The assessment of noise from construction activities assumes a baseline year of 2017 which represents the period immediately prior to the start of the construction period. As a reasonable worst case, it has been assumed that no change in baseline sound levels will occur between the existing baseline (2012/13) and the future baseline year of 2017. The assessment of noise from construction traffic assumes a baseline year of 2021, representative of the middle of the construction period when the construction traffic flows are expected to be at their peak. Further information can be found in Section 12, Traffic and transport.

### *Operation (2026)*

11.2.10 The assessment is based upon the predicted change in sound levels that result from the Proposed Scheme. The assessment initially considered a worst case (that would overestimate the change in levels) by assuming that sound levels would not change from the existing baseline year of 2012/2013. Where significant effects were identified on this basis, the effects have been assessed using a baseline year of 2026 to coincide with the proposed start of passenger services. The future baseline is for the sound environment that would exist in 2026 without the Proposed Scheme.

[66] Further information is available in the Volume 5: Appendix SV-001-000, the SMR and its Addendum.
[67] Tyre noise typically becomes the dominant sound source for steady road traffic at speeds above approximately 30mph.

## 11.3 Effects arising during construction

### Local assumptions and limitations

#### *Local assumptions*

11.3.1 The construction arrangements that form the basis of the assessment are presented in Section 2.3 of this report.

11.3.2 Although it is anticipated that there may be some night-time working during road possession periods, it is expected that the noise effects would be limited in duration and would hence not be considered significant.

11.3.3 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.

#### *Local limitations*

11.3.4 In this area, there are a number of locations where the land or property owners did not permit baseline sound level monitoring to be undertaken at their premises. However, sufficient information has been obtained to undertake the assessment. Further information is provided in Volume 5: Appendix SV-002-021.

### Avoidance and mitigation measures

11.3.5 The assessment assumes the implementation of the principles and management processes set out in Section 13 of the draft CoCP which are:

- Best Practicable Means (BPM) as defined by the Control of Pollution Act 1974 (CoPA) and Environmental Protection Act 1990 (EPA) will be applied during construction activities to minimise noise (including vibration) at neighbouring residential properties;
- as part of BPM, mitigation measures are applied in the following order:
  - noise and vibration control at source: for example the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings[68]; and then
  - screening: for example local screening of equipment or perimeter hoarding;
- where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary re-housing will be offered in accordance with the draft CoCP noise insulation and temporary re-housing policy;
- lead contractors will seek to obtain prior consent from the relevant local authority under Section 61 of CoPA for the proposed construction works. The consent application will set out BPM measures to minimise construction noise,

[68] Warning signals that consist of bursts of noise.

including control of working hours, and provide a further assessment of construction noise and vibration including confirmation of noise insulation/temporary re-housing provision;

- contractors will undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data will be provided regularly to and be reviewed by the Nominated Undertaker and will be made available to the local authorities; and
- contractors will be required to comply with the terms of the CoCP and appropriate action will be taken by the Nominated Undertaker as required to ensure compliance.

11.3.6 In addition to this mitigation, taller screening as described in the draft CoCP[69] has been assumed along the edge of the construction site boundary adjacent to the residential communities at: the rural areas to the west and south west of Hints; the edge of the northbound carriageways of the A453 Sutton Road and Waggoners Lane, both located west of Drayton Bassett; the edge of the southbound carriageway of the A51 Tamworth Road near DMS Whittington; and the western edge of Jerry's Lane.

11.3.7 Noise insulation will be offered for qualifying buildings as defined in the draft CoCP's Noise insulation and temporary re-housing policy. Noise insulation or ultimately temporary re-housing will avoid residents being significantly affected[70] by levels of construction noise inside their dwellings. The assessment reported in this section provides an estimate of the buildings that are likely to qualify for such measures.

11.3.8 Qualification for noise insulation and temporary re-housing will be identified as part of seeking prior consent from the local authorities under Section 61 of the Control of Pollution Act. Qualifying buildings will be identified early enough so that noise insulation can be installed, or temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria. Noise insulation, where required, will be installed as early as possible to reduce internal sound levels from construction activities and also when the Proposed Scheme comes into operation.

## Assessment of impacts and effects

### *Residential receptors: direct effects – individual dwellings*

11.3.9 Taking account of the avoidance and mitigation measures set out in the previous paragraphs, one residential building, Mill House on Bangley Lane closest to the Bangley Lane overbridge, is forecast to experience noise levels higher than the noise insulation trigger levels as defined in the draft CoCP. For daytime construction the trigger level is 75dB[71] measured outdoors.

[69] 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.
[70] Information is provided in the emerging National Planning Practice Guidance – Noise http://planningguidance.planningportal.gov.uk, e.g. the table summarising the noise exposure hierarchy. (Accessed 13 November 201.3).
[71] $L_{pAeq,0800\text{-}1800}$ measured at the façade.

11.3.10 The mitigation measures, including noise insulation for Mill House, will reduce noise inside all dwellings such that it does not reach a level where it would significantly affect[70] residents.

### *Residential receptors: direct effects – communities*

11.3.11 With regard to noise outside dwellings, the assessment of temporary adverse effects[70] takes account of construction noise relative to existing sound levels.

11.3.12 In locations with lower existing sound levels[72], 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. But, in this area, the mitigation measures reduce the effects of outdoor construction noise on the acoustic character around the local residential communities such that the adverse effects identified are considered to be not significant.

### *Residential receptors: indirect effects*

11.3.13 Significant noise effects on residential receptors arising from construction traffic are unlikely to occur in this area.

### *Non-residential receptors: direct effects*

11.3.14 Significant construction noise or vibration effects on non-residential receptors are unlikely to occur in this area.

### *Non-residential receptors: indirect effects*

11.3.15 Significant noise effects on non-residential receptors arising from construction traffic are unlikely to occur in this area.

## Cumulative effects from the Proposed Scheme and other committed development

11.3.16 This assessment has considered the potential cumulative construction noise effects of the Proposed Scheme and other committed developments as identified in Volume 5: Appendix CT-000-004. In this area, no committed development would be built at the same time as the Proposed Scheme and accordingly, construction noise or vibration from the Proposed Scheme is unlikely to result in any significant cumulative noise effects.

## Summary of likely residual significant effects

11.3.17 The mitigation measures reduce noise inside all dwellings from the construction activities such that it is does not reach a level where it would significantly affect[70] residents.

11.3.18 The measures also reduce the effect[70] of outdoor construction noise on the acoustic character around the local residential communities such that the effects are not considered to be significant.

[72] Further information is provided in Volume 5: Appendix SV-001-000.

## 11.4 Effects arising during operation

### Local assumptions and limitations

#### *Local assumptions – service pattern*

11.4.1 The effects of noise and vibration from the operation of the Proposed Scheme have been assessed based on the highest likely train flows, including the Phase Two services. Trains are expected to be 400m long during peak hours and a mix of 200m and 400m-long trains at other times.

11.4.2 The expected passenger service frequency for both Phase One, and Phase One with Phase Two services are described in Volume 1[73]. As a reasonable worst case, this assessment is based upon the service pattern for Monday to Saturday including Phase Two services. Passenger services will start at or after 05:00 from the terminal stations and in this area will progressively increase to the number of trains per hour in each direction on the main lines set out in Table 20. This number of services is assumed to operate every hour from 07:00 to 21:00. The number of services will progressively decrease after 21:00 and the last service will arrive at terminal stations by 24:00. Train speeds are shown in Table 20.

Table 20: Train flows and speeds

| Description of line | Time period for peak daytime flows | Number of trains per hour in each direction with Phase Two services (Phase One only trains per hour in each direction is set out in brackets) | Speed |
|---|---|---|---|
| Main line between Leeds spur and Manchester spur | 07:00-21:00 | 12 (8) | 330kph for timetabled trains (assumed 90% of services), and 360kph for 10% of services |

### Avoidance and mitigation measures

11.4.3 The development of the Proposed Scheme has kept the alignment away from main communities and on the surface has been placed as low in the ground, as far as reasonably practicable. The design development has avoided causing some significant noise or vibration effects.

#### *Airborne noise*

11.4.4 HS2 trains will be quieter than the relevant current European Union specifications. This will include reduction of aerodynamic noise from the pantograph that otherwise would occur above 300kph (186mph) with current pantograph designs, drawing on proven technology in use in East Asia. The track will be specified to reduce noise, as will the maintenance regime. Overall these measures would reduce noise emissions by approximately 3dB at 360kph compared to a current European high speed train operating on the new track. Further information is provided in Volume 5: Appendix SV-001-000.

11.4.5 To avoid or reduce significant airborne noise effects, the Proposed Scheme incorporates noise barriers in the form of landscape earthworks, noise fence barriers

[73] The change in noise and vibration effects between the different passenger services is assessed in Volume 1.

and/or 'low-level' barriers on underbridges and viaducts. Noise barrier locations are shown in Volume 2: CFA21 Map Book, Map series SV-05.

11.4.6 Generally, the assessment has been based on noise barriers having a noise reduction performance equivalent to a noise fence barrier with a top level 3m above the top of the rail, which is acoustically absorbent on the railway side, and which is located 5m to the side of the outer rail. In practice, barriers may differ from this description, but will provide the same acoustic performance. For example, where noise barriers are in the form of landscape earthworks they will need to be higher above rail level to achieve similar noise attenuation to a 3m barrier because the crest of the earthwork will be further than 5m from the outer rail.

11.4.7 The Proposed Scheme incorporates 'low-level' barriers into the design of underbridges and viaducts. Where needed to avoid or reduce significant airborne noise effects, these barriers are designed to provide noise reduction that is equivalent to a 2m high absorptive noise barrier located on the parapet of the viaduct. Locating these 'low-level' barriers close to the rail also reduces visual impact and limits the mass of the viaduct itself.

11.4.8 Noise effects are reduced in other locations along the line by landscape earthworks provided to avoid or reduce significant visual effects and engineering structures such as cuttings and safety fences on viaducts (where noise barriers are not required). The location of these barriers is shown on Volume 2: CFA21 Map Book, Map series SV-05.

11.4.9 Significant noise effects from the operational static sources such as line-side equipment will be avoided through their design and the specification of noise emission requirements (for more information, see Volume 5: Appendix SV-001-000).

11.4.10 Noise insulation measures will be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996[74] (the Regulations). The assessment reported in this section provides an estimate of the buildings that are likely to qualify under the Regulations. Qualification for noise insulation under the Regulations will be identified and noise insulation offered at the time that the Proposed Scheme becomes operational.

11.4.11 Where required, as well as improvements to windows facing the railway to improve noise insulation, ventilation will be provided so that windows can be kept closed to protect internal sound levels.

11.4.12 Following Government's emerging National Planning Practice Guidance[75], where the noise from the use of the Proposed Scheme measured outside a dwelling exceeds the Interim Target defined by the WHO Night Noise Guidelines for Europe[76], residents are considered to be significantly affected by the resulting noise inside their dwelling. The effect on people at night due to the maximum sound level as each train passes has also been assessed[77]. The Interim Target is a lower level of noise exposure than the Regulations trigger threshold for night noise. In these particular circumstances, where

[74] *The Noise Insulation (Railways and Other Guided Transport Systems) Regulations* (1996). London, Her Majesty's Stationery Office.
[75] National Planning Practice Guidance – Noise http://planningguidance.planningportal.gov.uk.
[76] World Health Organization (2010), *Night-time Noise Guidelines for Europe*.
[77] During the night (2300-0700) a significant effect is also identified where the Proposed Scheme results in a maximum sound level at the façade of a building at or above: 85dB $L_{pAFmax}$ (where the number of train pass-bys exceeding this value is less than or equal to 20); or 80dB $L_{pAFmax}$ (where the number of train pass-bys exceeding this value is greater than 20).

night-time noise levels for the use of new or additional railways authorised by the Bill are predicted following the methodology set out in the Regulations to exceed 55dB[78], or the maximum noise level (dependent on the number of train passes) as a train passes exceeds the criterion[77], noise insulation will be offered for these additional buildings.

### *Ground-borne noise and vibration*

11.4.13 Significant ground-borne noise or vibration effects will be avoided or reduced through the design of the track and track-bed.

## Assessment of impacts and effects

### *Residential receptors: direct effects – individual dwellings*

#### Surface sections of route; airborne noise and ground-borne vibration

11.4.14 Taking account of the avoidance and mitigation measures incorporated into the Proposed Scheme, the assessment has identified two residential buildings, Mill House, Bangley Lane, and Packington Moor Farm, Jerry's Lane, Lichfield, close to the Proposed Scheme, where noise would exceed the daytime trigger threshold set in the Regulations. It is therefore estimated that these buildings are likely to qualify for noise insulation under the Regulations. It is indicated on Volume 2: CFA21 Map Book, Map series SV-05.

11.4.15 The mitigation measures including noise insulation will reduce noise inside all dwellings such that it will not reach a level where it would significantly affect residents.

### *Residential receptors: direct effects – communities*

11.4.16 The mitigation measures in this area will avoid airborne noise adverse effects on the majority of receptors, and at the following residential communities: Drayton Bassett; Hints; and Weeford.

11.4.17 Taking account of the envisaged mitigation, Volume 2: CFA21 Map Book, Map series SV-05 shows the long-term 40dB[79] night-time sound level contour from the operation of trains on the Proposed Scheme. The extent of the 40dB night-time sound level contour is equivalent to, or slightly larger than, the 50dB daytime contour[80]. In general, below these levels adverse effects are not expected.

11.4.18 Above 40dB during the night and 50dB during the day the effect of noise is dependent on the baseline sound levels in that area and the change in sound level (magnitude of effect) brought about by the Proposed Scheme. The airborne noise impacts and effects forecast for the operation of the scheme are presented on Volume 2: CFA21 Map Book, Map series SV-05.

11.4.19 The changes in noise levels are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life and may be considered to be

[78] Equivalent continuous level, $L_{pAeq,23:00-07:00}$ measured without reflection from the front of buildings.
[79] Defined as the equivalent continuous sound level from 23:00 to 07:00 or $L_{pAeq,night}$).
[80] With the train flows described in the assumptions section of this CFA Report, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or $L_{pAeq,day}$) from the Proposed Scheme would be approximately 10dB higher than the night-time sound level. The 40dB contour therefore indicates the distance from the Proposed Scheme at which the daytime sound level would be 50dB.

significant when assessed on a community basis taking account of the local context[81]. When considered on this basis, none of the adverse effects in this area are considered to be significant.

### *Residential receptors: indirect effects*

11.4.20 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

### *Non-residential receptors: direct effects*

11.4.21 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptors identified in Table 21.

11.4.22 The assessment of effects on non-residential receptors has been undertaken on a worst case basis taking account of public available information about each receptor. Further information can be found in Volume 5: Appendix SV-004-021.

Table 21: Likely significant noise or vibration effects on non-residential receptors arising from operation of the Proposed Scheme

| Significant effect number (see Map series SV-05) | Type of significant effect and source | Time of day | Location and details |
|---|---|---|---|
| OSV21-N01 | Major adverse noise effect on the acoustic character outside the buildings and on a worst case basis there is a risk of disturbing activities inside the buildings due to the operation of train services | Daytime/ night-time | Holiday accommodation (if the business is continued) at Packington Moor Farm, Jerry's Lane, Lichfield |

### *Non-residential receptors: indirect effects*

11.4.23 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

## Summary of likely significant residual effects

11.4.24 The mitigation measures reduce noise inside all dwellings such that it does not reach a level where it would significantly affect residents.

11.4.25 The avoidance and mitigation measures in this area will avoid noise and vibration adverse effects on the majority of receptors and all residential communities in this area.

11.4.26 On a worst-case basis a significant noise effect has been identified on the holiday accommodation at Packington Moor Farm, Jerry's Lane, Lichfield.

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.

[81] Further information is provided in SV-001-000 and SV-004-021.

# 12 Traffic and transport

## 12.1 Introduction

12.1.1 This traffic and transport section describes the likely impacts on all forms of transport and the consequential effects on transport users arising from the construction and operation of the Proposed Scheme through the Drayton Bassett, Hints and Weeford area.

12.1.2 With regard to traffic and transport, the main issues are increased traffic as a result of implementation of the Proposed Scheme, road realignments and consequential temporary road closures, and temporary and permanent realignments of PRoW.

12.1.3 The effects on traffic and transport have been assessed quantitatively, based on baseline traffic conditions and future projection scenarios.

12.1.4 A detailed report on traffic and transport and surveys undertaken within the area is contained in Volume 5: Appendix TR-001-000, Transport Assessment.

12.1.5 Volume 2: CFA21 Map Book, Map series CT-10 shows the location of the key transport infrastructure in this area.

12.1.6 Engagement has been undertaken with the key transport authorities including Staffordshire County Council (SCC), and the Highways Agency (HA).

## 12.2 Scope, assumptions and limitations

12.2.1 The assessment scope, key assumptions and limitations for the traffic and transport assessment are set out in Volume 1, the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

12.2.2 The study area includes Shirrall Drive, Drayton Lane, the A453 Sutton Road, Bangley Lane (known locally as Waggoner's Lane), Brockhurst Lane (known locally as Rookery Lane), the A5, Watling Street, Flats Lane and the A51 Tamworth Road.

12.2.3 A number of transport modelling tools have been used to inform the assessment including the Department for Transport's traffic forecasting tool, Trip End Model Presentation Program (TEMPRO), for future forecast road traffic growth in the area. The assessment covers the morning (08:00-09:00) and evening (17:00-18:00) peak periods for an average weekday.

## 12.3 Environmental baseline

### Existing baseline

12.3.1 Existing conditions in the area have been determined through site visits, specially commissioned transport surveys, and liaison with Staffordshire transport authorities and stakeholders to source information on public transport, highway flows, PRoW and accident data.

12.3.2 Traffic surveys of roads crossing the route or potentially affected were undertaken in June, July and November 2012, with additional surveys undertaken in May and June

2013, comprising junction turning counts and queue surveys, as well as automatic traffic counts. This was supplemented by traffic and transport data obtained from other sources, including from the Highways Agency and survey information held by the local authorities. The highway peak hours in the study area were 08:00-09:00 and 17:00-18:00.

12.3.3 PRoW surveys were undertaken in August and September 2012 to establish the nature of the PRoW and their usage by pedestrians, cyclists and equestrians (non-motorised users). The surveys included PRoW and roads that will cross the route of the Proposed Scheme, and additional PRoW and roads that will be affected by the Proposed Scheme. The Proposed Scheme affects 14 PRoW within the Drayton Bassett, Hints and Weeford area and crosses each of these. Seven of the routes were used by fewer than ten people a day. The routes with the greatest usage were Swinfen and Packington Bridleway 8 (part of the Heart of England), with 72 users and the Hints Footpath 4 with 46 users per day. The Proposed Scheme crosses one road with footways.

12.3.4 There are several strategic routes that pass through the area. The M6 Toll travels in a south/north direction and is accessed in this area via the A38/A5/Watling Street junction and the A5148/A5 junction. The A5 travels in a broadly west/east direction and is accessed in the area from the A5/A38/M6 Toll slip roads roundabout and Watling Street. The A38 runs in a north/south alignment through the western fringe of the area and is accessed from the A38/A446/A453 Sutton Road roundabout, the A5/A38/M6 Toll slip roads roundabout and the A38/A5148/A5206 roundabout.

12.3.5 The main local roads affected by the Proposed Scheme are the A446 London Road, which travels in a north/south orientation and is situated in the south-western edge of this area; Shirrall Drive, which connects the A453 Sutton Road in the west with Drayton Lane in the east; Drayton Lane, which provides access to the village of Drayton Bassett; the A453 Sutton Road, which runs between the A38/A446/A453 Sutton Road roundabout in the south-west and Mile Oak in the north-east; Bangley Lane, which runs broadly parallel to the A453 Sutton Road and connects a number of farms; Brockhurst Lane, which runs broadly parallel in the north to Bangley Lane; Watling Street, which runs in this area between the A5/A38/M6 Toll slip roads roundabout and Mile Oak; Flats Lane, which connects Watling Street in the south with Whittington Barracks in the north; and the A51 Tamworth Road, which connects Hopwas in the south and Lichfield in the north.

12.3.6 Safety and accident data for the road network subject to assessment has been obtained from SCC for the three year period up to 2012. This has been assessed and no significant accident clusters were identified within the area.

12.3.7 There is one public bus service, route number 110, which passes through the Drayton Bassett, Hints and Weeford area serving Mile Oak. The bus service provides connections to Birmingham, Sutton Coldfield, Mile Oak and Tamworth. This service provides a maximum service frequency of four buses per hour between Monday and Friday.

12.3.8 Within this area there are no existing national or local rail services or navigable waterways in the area and consequently these are not considered further in this assessment.

### Future baseline

12.3.9 The future baseline traffic volumes have been calculated by applying growth factors based on TEMPRO for the years of assessment 2021 and 2026 with extrapolation to 2041, also taking account of any major locally consented schemes. No other changes to the traffic and transport baseline are anticipated in this area.

#### *Construction*

12.3.10 Construction activities have been assessed against 2021 baseline traffic flows, irrespective of when they occur during the construction period. Future baseline traffic volumes in the peak hours are forecast to grow by around 11% by 2021 compared to 2012.

#### *Operation (2026)*

12.3.11 Future baseline traffic volumes in the peak hours are forecast to grow by around 17% by 2026 compared to 2012.

#### *Operation (2041)*

12.3.12 Future baseline traffic volumes in the peak hours are forecast to grow by around 37% by 2041 compared to 2012.

## 12.4 Effects arising during construction

### Avoidance and mitigation measures

12.4.1 The following measures (as detailed in Section 2) have been included as part of the engineering design of the Proposed Scheme and will avoid or reduce effects on transport users:

- construction materials and equipment will be transported along the haul road adjacent to the Proposed Scheme alignment where reasonably practicable to reduce lorry movements on the public highway;
- the majority of roads crossing the Proposed Scheme will be kept open during construction;
- the Proposed Scheme includes permanent realignments/diversions of 14 PRoW and temporary re-routeing as necessary to reduce loss of amenity;
- road closures will be limited to overnight and/or weekends;
- traffic management tools will be utilised on the A5 in order to avoid road closure;
- heavy goods vehicle (HGV) routeing will be along the strategic road network and use designated routes for access as shown in Map TR-03-106 (Volume 5, Map Book, Traffic and Transport);
- materials will be transported by rail where reasonably practicable to reduce the potential numbers of HGV trips that would otherwise be made on the highway network; and
- provision of on-site accommodation and welfare facilities (provided in CFA22) to reduce daily travel by site workers.

12.4.2 The draft Code of Construction Practice (CoCP) (see Volume 5: Appendix CT-003-000) includes measures that seek to reduce the impacts and effects of deliveries of construction materials and equipment, including reducing construction lorry trips during peak background traffic periods. The draft CoCP includes HGV management and control measures.

12.4.3 Where reasonably practicable, the number of private car trips to and from each site (both workforce and visitors) will be reduced by encouraging alternative modes of transport or vehicle sharing. This will be supported by an over-arching framework travel plan[82] that will require travel plans to be used along with a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the Proposed Scheme. As part of this, a construction workforce travel plan will be put into operation with the aim of reducing workforce commuting by private car, especially sole occupancy car travel. Where practicable, particularly in a rural context, this will encourage the use of sustainable modes of transport.

12.4.4 The measures in the draft CoCP will include clear controls on vehicle types, hours of site operation, and routes for heavy goods vehicles, to reduce the impact of road based construction traffic. In order to achieve this, generic and site specific traffic management measures will be implemented during the construction of the Proposed Scheme on or adjacent to public roads, footpaths and other PRoW affected by the Proposed Scheme as necessary.

12.4.5 Specific measures will include:

- core site operating hours will be 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays and site staff and workers will therefore generally arrive before the morning peak hour and depart after the evening peak hour (although the assessment has assumed that some of work journeys to the construction sites take place within the morning and evening peak hours to reflect a reasonable worst-case scenario) (draft CoCP, Section 5); and
- excavated material will be reused where reasonably practicable along the alignment of the Proposed Scheme which will reduce the effects of construction vehicles on the public highway (draft CoCP, Section 15).

## Assessment of impacts and effects

### *Temporary effects*

12.4.6 The following section considers the impacts on traffic and transport and the consequential effects resulting from construction of the Proposed Scheme.

12.4.7 The temporary traffic and transport impacts within this CFA will be:

- construction vehicle movements to/from satellite construction compounds and the roadheads;
- road closures and associated overnight and/or weekend diversions;

[82] Construction and operational travel plans will promote the use of sustainable transport modes as appropriate to the location and types of trip. They will include measures such as: provision of information on and promotion of public transport services; provision of good cycle and pedestrian facilities; liaison with public transport operators; promotion of car sharing; and the appointment of a travel plan coordinator to ensure suitable measures are in place and are effective.

- closure of Brockhurst Lane for a period of approximately 12 months;
- implementation of traffic management measures on the A5; and
- PRoW diversions.

12.4.8 Construction vehicle movements required to construct the Proposed Scheme will include the delivery of plant and materials, movement of excavated materials and site worker trips.

12.4.9 Details of construction compounds are provided in Section 2.3, Construction of the Proposed Scheme. Some compounds only have traffic movements to other locations within the construction area. There are no main construction compounds in this area; satellite compounds will be managed by the A4097 Kingsbury Road main compound in CFA20 (Curdworth to Middleton) and the Cappers Lane main compound in CFA22 (Whittington to Handsacre).The duration of when there will be busy transport activity at each site is shown in Table 22. This represents the periods when the construction traffic flows will be greater than 50% of the peak flows. Also shown is the estimated number of daily vehicle trips during the peak month of activity, the lower end of the range shows the average number of trips in the busy period and the upper end the peak month flows. The assessment scenario has assumed the peak month for the combination of activities, i.e. not necessarily the peak activity at each individual site.

Table 22: Typical vehicle trip generation for construction site compounds in this area

| Compound type | Location | Access to/from compound | Indicative start/set up date | Estimated duration of use (years) | Estimated duration with busy vehicle movements (months) | Average daily combined two-way vehicle trips during busy period and within peak month of activity | |
|---|---|---|---|---|---|---|---|
| | | | | | | Cars/LGV | HGV |
| Satellite | Drayton Bassett viaduct compound | Drayton Lane to A453 Sutton Road | June 2018 | 2 | 22 | 45 | 30-45 |
| Satellite | Drayton Lane overbridge compound | Drayton Lane to A453 Sutton Road | June 2018 | 1 | 8 | 35 | 30-40 |
| Satellite | Drayton Lane auto-transformer station | Drayton Lane to A453 Sutton Road | October 2022 | 1 | 10 | 45-70 | <5 |
| Satellite | A453 Sutton Road overbridge compound | A453 Sutton Road | June 2018 | 3 | 14 | 35-50 | 40-60 |
| Roadhead | A453 Sutton Road | Via A45 3 Sutton Road | February 2019 | 3 | 20 | - | 655-1105 |
| Satellite | Bangley Lane (Hints Bridleway 20) accommodation overbridge compound | Track/haul route via A453 Sutton Road overbridge | - | - | - | Few external movements | |

| Compound type | Location | Access to/from compound | Indicative start/set up date | Estimated duration of use (years) | Estimated duration with busy vehicle movements (months) | Average daily combined two-way vehicle trips during busy period and within peak month of activity | |
|---|---|---|---|---|---|---|---|
| | | | | | | Cars/LGV | HGV |
| Satellite | Hints Footpath 9 underpass compound | Track/haul route via A453 Sutton Road overbridge | - | - | - | Few external movements | |
| Satellite | Hints Footpath 14 green overbridge compound | Haul route to Watling Street onto A5, A38 to west | - | - | - | Few external movements | |
| Satellite | Brockhurst Lane underbridge compound | Along haul road onto Watling Street onto A5, A38 to west | July 2018 | 3.5 | 10 | 40-50 | 65-85 |
| Satellite | Black Brook viaduct compound | Watling Street onto A5, A38 to west | July 2017 | 4.5 | 17 | 150-165 | 95-135 |
| Roadhead | Watling Street | Watling Street | August 2019 | 3 | 17 | - | 970-1000 |
| Satellite | A5 Trunk Road (Weeford-Fazeley Improvement) overbridge (east) compound | Watling Street onto A5, A38 to west | - | - | - | Few external movements | |
| Satellite | A5 Trunk Road (Weeford-Fazeley Improvement) overbridge (west) compound | Watling Street onto A5, A38 to west | - | - | - | Few external movements | |
| Satellite | Flats Lane overbridge compound | Flats Lane/Watling Street onto A5, A38 | June 2018 | 1.5 | 9 | 45-50 | 30-45 |
| Satellite | Flats Lane auto-transformer station | Flats Lane/Watling Street onto A5, A38 | October 2022 | 1 | 10 | 45-70 | <5 |
| Satellite | A51 Tamworth Road overbridge compound | A51 Tamworth Road | June 2018 | 3.5 | 17 | 40-50 | 40-50 |
| Satellite | A51 Tamworth Road package substation | A51 Tamworth Road | - | - | - | Few external movements | |

12.4.10 Details of the construction phasing are provided in Section 2.3. The construction assessment considers the traffic and transport impacts and effects in three peak periods of construction activity, based on the proposed phasing of the works. The peak periods have been identified as Month 27 to 35 (2018 Quarter 3 to 2019 Quarter

1), Months 36 to 41 (2019 Quarter 2 to Quarter 3) and Month 26 (2018 Quarter 2). In Months 27 to 35 there will be 12 compounds operational, in Months 36 to 41 there will be 10 operational and in Month 26 there will be nine that will be in operation. Where impacts are significant in any of these periods they are identified, together with the effects of other significant changes outside these peak periods.

12.4.11 It is envisaged that the M6 Toll, the A5, A38 and the A453 Sutton Road will provide the primary HGV access and egress routes for construction traffic.

12.4.12 Construction of the Proposed Scheme will result in changes in traffic flows and delays to vehicle users due to increased traffic flows from workers and construction vehicles accessing compounds, and also temporary road closures and diversions.

12.4.13 There will be overnight and/or weekend closures on Drayton Lane, A453 Sutton Road, Watling Street, Flats Lane and the A51 Tamworth Road. The effect of these measures on traffic flows and delays to vehicle occupants as a result of the diversions or traffic congestion[83] will not be significant.

12.4.14 In addition to the overnight and/or weekend closures Brockhurst Lane will be closed for a duration of up to 12 months. The alternative route from some vehicles could be up to 11km. Due to the expected low flows on this road this is not assessed as giving rise to a significant effect. A temporary pedestrian link will be maintained to reduce the impact.

12.4.15 Traffic management measures such as lane restrictions will be in use on the A5 (see section 2.3 for details of construction phasing); these are not assessed to give rise to significant effects.

12.4.16 Changes in traffic flows will lead to a significant increase in congestion and delays to vehicle users in the following locations:

- A38 London Road/A453 Tamworth Road/A446 London Road junction (minor adverse effect);
- A38/A5148/A5206 London Road junction (moderate adverse effect); and
- A5/A5127 Birmingham Road/A5148 junction (moderate adverse effect).

12.4.17 Construction of the Proposed Scheme is forecast to result in significant increases in daily HGV traffic flow (i.e. more than 30% for HGV) causing a significant increase in traffic-related severance[84] (but not causing congestion unless noted above) in the following locations:

- Drayton Lane, between the A453 Sutton Road and approximately 100m east of Shirrall Drive (moderate adverse effect);

[83] In assessing significant effects of traffic changes on congestion and delays, a major adverse effect occurs where traffic flows at a junction will be beyond or very close to capacity with the Proposed Scheme and the increases in traffic due to the Proposed Scheme will be such as to substantially increase queues and delays on a routine basis at peak times. A moderate adverse effect will occur when traffic flows at a junction will be approaching or at capacity with the Proposed Scheme and modest increases in traffic will increase the frequency of queues and more substantial delays. A minor adverse effect occurs when traffic flows at a junction are not generally exceeding capacity with the Proposed Scheme but the increase in flows will result in occasional queues and delays or small increases in existing delays.

[84] In the context of this Traffic and transport section, 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 a route is closed for access.

- A453 Sutton Road, between the A446 London Road/A38 junction and the A5/B5404 Plantation Lane (moderate adverse effect);
- Watling Street, between the A38 and approximately 700m east of Weeford Road (major adverse effect);
- Flats Lane, from Watling Street for approximately 750m (minor adverse effect);
- A453/Drayton Lane (moderate adverse effect);
- A453/Watling Street/Hints Road (moderate adverse effect);
- A5/A435/Bonehill Rd/B5404 (moderate adverse effect);
- A38/A5148 (moderate adverse effect); and
- M6 Toll/A38/A5 (major adverse effect).

12.4.18 Utility works (including diversions) have been assessed in detail where they are major works and where the traffic and transport impacts from the works separately, or in combination with other works, are greater than other construction activities arising within the area. More minor utilities works are expected to result in only localised traffic and pedestrian diversions that will be of short term duration. No additional significant effects are expected.

12.4.19 The effect on accident and safety risks will not be significant. There are no locations where there are existing highway safety issues and where there will be substantial increases in traffic during construction.

12.4.20 It is not expected that the construction of the Proposed Scheme will require a bus route diversion, as road closures are proposed overnight, when the bus service will not be operational. Thus, in this area there will be no significant effect on bus passenger delays.

12.4.21 Construction of the Proposed Scheme is unlikely to result in any temporary loss of pedestrian access to public transport services. There are no stations/interchanges that will be affected by the Proposed Scheme in this area.

12.4.22 There will be a minor adverse effect on non-motorised users due to increased travel distances for two PRoW. Hints Footpath 9 and Hints Footpath 14 will be diverted by approximately 100m each. Effects of permanent PRoW realignments are reported in the operation section 12.5.

12.4.23 There will be four minor adverse effects in journey ambience for non-motorised users of PRoW within this area. These are: Swinfen and Packington Bridleways 5 and 7, where users of the PRoW will have to cross a road utilised by construction traffic, Hints Bridleway 20 and Drayton Bassett Bridleway 10, where users of the PRoW will operate alongside the route.

### *Cumulative effects*

12.4.24 The assessment includes cumulative effects of planned development during construction by taking this into account within the background traffic growth.

12.4.25 The assessment also includes for in-combination effects by taking into account traffic and transport impacts of works being undertaken in neighbouring CFA areas. Construction traffic flows of 500 cars/LGV and 1780 HGV per day inbound and 560 cars/LGV and 1780 HGV outbound as generated from CFA20 (Curdworth to Middleton) and CFA22 (Whittington and Handsacre) have been included in the assessment.

### *Permanent effects*

12.4.26 Any permanent effects of construction have been considered in the operations phase assessments for traffic and transport in Section 12.5. This is because the impacts and effects of the forecast increases in travel demand and the wider impacts and effects of the operations phase need to be considered together.

## Other mitigation measures

12.4.27 The implementation of the CoCP (see Volume 5: Appendix CT-003-000) in combination with the construction workforce travel plan will, to some degree, mitigate the transport related effects during construction of the Proposed Scheme. The reductions in effects arising from these travel plan measures have not been included in the assessment, which will mean the adverse effects may be over-stated.

12.4.28 No further traffic and transport mitigation measures during construction of the Proposed Scheme are considered necessary, based on the outcomes of this assessment.

## Summary of likely residual significant effects

12.4.29 The most intensive peak periods of construction will cause additional congestion, increasing delays for road users on the A38/London Road/A453 Tamworth Road/A446 London Road junction, the A38/A5148/A5206 London Road junction and the A5/A5127 Birmingham Road/A5148 junction.

12.4.30 Similarly, increased traffic will cause increases in traffic that will affect pedestrians, cyclists and equestrians crossing and using: Drayton Lane, between the A453 Sutton Road and approximately 100m east of Shirrall Drive; A453 Sutton Road, between the A446 London Road/A38 junction and the A5/B5404 Plantation Lane; Watling Street, between the A38 and approximately 700m east of Weeford Road; Flats Lane, from Watling Street for approximately 750m; A453/Drayton Lane; A453/Watling Street/Hints Road; A5/A435/Bonehill Rd/B5404; A38/A5148 and M6 Toll/A38/A5.

12.4.31 Two PRoW (Hints Footpath 9 and Hints Footpath 14) will be temporarily affected and users will be diverted during the construction period with increased walking distances. Permanent PRoW diversions will also occur and are reported in Section 12.5.

12.4.32 The journey ambience of four PRoW (Swinfen and Packington Bridleways 5 and 7, Hints Bridleway 20 and Drayton Bassett Bridleway 10) will be affected due to construction vehicles operating alongside or crossing the PRoW.

12.4.33 The significant effects that result from operation of the Proposed Scheme are shown on Map TR-03-106 (Volume 5, Map book 71).

## 12.5 Effects arising from operation

### Avoidance and mitigation measures

12.5.1 The following measures have been included as part of the design of the Proposed Scheme and will avoid or reduce impacts on transport users:

- retaining the majority of roads crossing the Proposed Scheme in, or very close to their current location; and
- retaining PRoW crossing the Proposed Scheme, with localised realignments kept to a minimum where reasonably practicable.

### Assessment of impacts and effects

12.5.2 The following section considers the impacts on traffic and transport and the consequential effects resulting from the operational phase of the Proposed Scheme (as described in Section 2.4 Operation of the Proposed Scheme).

12.5.3 The operational traffic and transport impacts within this CFA will be:

- realignment and diversion of roads;
- permanent PRoW realignments; and
- traffic accessing the areas of the Proposed Scheme for maintenance purposes.

12.5.4 There will be localised permanent realignments of eight roads (Drayton Lane, Shirrall Drive, the A453 Sutton Road, Bangley Lane, Watling Street, the A5, Flats Lane and the A51 Tamworth Road). These realignments will result in changes in journey length of less than 100m and will not cause any significant effects.

12.5.5 Brockhurst Lane will be permanently closed as a public highway; private access and a public footpath will be maintained, but with a reduced headroom of 2.7m. It is not expected that this will result in a significant impact as the road is not adopted 200m west of the proposed rail bridge.

12.5.6 Traffic flows are expected to be similar to those forecast without the Proposed Scheme in both 2026 and 2041. The only changes to traffic will be occasional traffic that may access areas of the Proposed Scheme for maintenance purposes. However, these infrequent vehicle movements are expected to be very low and will therefore have no significant effect, including no effects on travel times or non-motorised users.

12.5.7 The effect on accidents and safety risks will not be significant as there are no substantial increases in traffic due to the operation of the Proposed Scheme.

12.5.8 The Proposed Scheme will have no effect on the one bus service, bus route number 110, which will be crossed by the alignment of the Proposed Scheme. Road realignment will have no substantial effect on journey times. There will be no significant effects on public transport within this area.

12.5.9 Fourteen PRoW will be realigned/diverted within this area. Of these, five will be realigned by less than 100m and the effects will not be significant. The Proposed Scheme will have a minor adverse effect on nine PRoW (Drayton Basset Bridleway 10, Hints Footpath 8, Hints Footpath 11, Hints Footpath 13, Hints Footpath 19, Swinfen

and Packington Bridleways 4, 5, 7 and 8).The maximum realignment of a PRoW in this area will be approximately 300m (Hints Footpath 19). This PRoW was utilised by 17 users during surveys undertaken.

### *Cumulative effects*

12.5.10 The assessment includes for the cumulative effects of planned development during operation, by taking this into account within the background traffic growth.

12.5.11 The assessment also considers in-combination effects by taking into account traffic and transport movements from other CFAs. However, there are no in-combination impacts from other CFAs in this area.

## Other mitigation measures

12.5.12 No further mitigation measures for the operation of the Proposed Scheme are considered necessary based on the outcomes of this assessment.

## Summary of likely significant residual effects

12.5.13 Nine PRoW (Drayton Basset Bridleway 10, Hints Footpath 8, Hints Footpath 11, Hints Footpath 13, Hints Footpath 19, Swinfen and Packington Bridleways 4, 5, 7 and 8) will be realigned with minor adverse significant increases in journey times for pedestrians, cyclists and equestrians.

12.5.14 The significant effects that will result from the Proposed Scheme are shown in Map TR-04-106 (Volume 5, Map Book, Traffic and Transport).

# 13 Water resources and flood risk assessment

## 13.1 Introduction

13.1.1 This section provides a description of the current baseline for water resources including surface water, groundwater and the baseline conditions for flood risk. It then reports on the likely impacts and significant effects on these aspects as a result of the construction and operation of the Proposed Scheme.

13.1.2 The main environmental features of relevance to water resources and flood risk that are present across the Drayton Bassett, Hints and Weeford area (CFA21) include:

- Black Brook, classified as a main river, intersects the Proposed Scheme, as do tributaries of Bourne Brook[85], which are ordinary watercourses;
- other ordinary watercourses that intersect the route include the Gallows Brook and tributaries of the River Tame;
- Principal aquifers within the Bromsgrove Sandstone Formation and Kidderminster Formation of Triassic age and the Early Permian Hopwas Breccia Formation;
- A Source Protection Zone 3 (SPZ3) designated within the Bromsgrove Sandstone Formation is crossed by the Proposed Scheme;
- a number of Secondary aquifers;
- numerous ponds and issues (springs); and
- a number of groundwater abstractions.

13.1.3 Key environmental issues relating to water resources and flood risk include:

- a need to culvert: a section of Gallows Brook east of Upper House Farm (part of the Langley Brook water body); and sections of Bourne Brook tributaries at White House Farm and Roundhill Wood;
- the potential impact of the viaduct crossings over the watercourses in this study area, specifically the Drayton Bassett and Black Brook viaducts;
- a section of a tributary of Bourne Brook at Roundhill Wood will require realignment;
- the realignment of watercourses as a result of straightening required for the culvert construction;
- the potential impact on groundwater flow to issues (similar to springs) and groundwater dependent ecological receptors in the area; and

[85] The Black Brook flows west to east the Drayton Bassett, Hints and Weeford area to the ford at Hints, where it changes its name to Bourne Brook. It flows into the River Tame at Tamworth to the east. Where the text refers to the entire length of the water course it is referred to as the Black-Bourne Brook.

- potential impacts on groundwater flow to local private abstractions.

13.1.4 Volume 5: Appendix WR-001-000 contains a report on the route-wide effects including:

- generic assessments on a route-wide basis;
- stakeholder engagement;
- in-combination effects;
- a draft operation and maintenance plan for water resources and flood risk;
- Water Framework Directive (WFD)[86] compliance assessment; and
- a route-wide Flood Risk Assessment (FRA).

13.1.5 Detailed reports on water resources and flood risk within the Drayton Bassett, Hints and Weeford area are also contained in the Volume 5 appendices. These include:

- Appendix WR-002-021 Water Resources Assessment report;
- Appendix WR-003-021 Flood Risk Assessment; and
- Appendix WR-004-014: Drayton Bassett, Hints and Weeford River Modelling Report.

13.1.6 Map series WR-01 to WR-03, WR-05 and WR-06 showing details referred to in this report and those in Volume 5 are all contained in the Volume 5: Map Book – Water resources.

13.1.7 Discussions have been held with the Environment Agency, Staffordshire County Council (SCC) as the Lead Local Flood Authority (LLFA) and the Canal & River Trust (formerly British Waterways).

## 13.2 Scope, assumptions and limitations

13.2.1 The assessment scope, key assumptions and limitations for the water resources and flood risk assessment are set out in Volume 1, Section 8 and in the SMR and its addendum (Volume 5: Appendices CT-001-000/1 and CT-001-000/2), and Volume 5: WR-002-021 and Volume 5: WR-003-021. This report follows the standard assessment methodology.

13.2.2 The spatial scope of the assessment was based upon the identification of surface water and groundwater features within 1km of the centre line of the route, except where there is clearly no hydraulic connectivity. For surface water features in urban areas, the extent was reduced to 500m. Outside these distances it is unlikely that direct impacts upon the water environment will be attributable to the Proposed Scheme. Where works extend more than 200m from the centre line, for example stations and depots, professional judgement was made in selecting the appropriate limit to the extension in spatial scope required. For the purposes of this assessment this is defined as the study area.

[86] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, European Parliament and European Council, Strasbourg.

13.2.3 Due to the number of ponds and other water features present within the study area, only those potentially affected, either within the land required for the construction or operation of the scheme, or within the calculated zone of influence, have been included in the assessment.

13.2.4 Site visits have been carried out to a tributary of the River Tame – from the source to Trickley Coppice, which is an ordinary watercourse.

13.2.5 Water Framework Directive (WFD) classification data has been made available by the Environment Agency. For surface water bodies that do not have a WFD status class shown in the relevant River Basin Management Plan (RBMP), the status class has been taken as the status class for the first downstream water body for which a status class is reported. Where groundwater does not have a WFD status class shown in the relevant River Basin Management Plan (RBMP), these are referred to as 'not assessed by the Environment Agency' in the summary of geology and hydrogeology Table 24.

13.2.6 Groundwater level data from the Environment Agency and other monitored locations such as private abstractions are limited in the study area. It is assumed that groundwater levels vary in a similar fashion to topography throughout the study area, with groundwater level contours roughly parallel to topographic contours. In the absence of more detailed information, it has been generally assumed that groundwater levels are within 1m of the ground surface.

13.2.7 The limitations associated with flood risk within this study area are described in detail in Volume 5: Appendix WR-003-021.

## 13.3 Environmental baseline

### Existing baseline – surface water resources

#### *Surface water features*

13.3.1 All water bodies within this study area fall within the Tame, Anker and Mease catchment that includes the Black-Bourne Brook, Gallows Brook and Langley Brook. This catchment falls within the Humber River Basin District (RBD) as set out within the RBMP[87].

13.3.2 The current surface water baseline is shown in Volume 5: Map Book – Water resources, Maps WR-01-035 and WR-01-036 and all surface water features within the study area are assessed within Volume 5: Appendix WR-002-021. Table 23 includes features potentially affected by the Proposed Scheme.

#### *Water Framework Directive status*

13.3.3 The Environment Agency notes that the overall WFD status of both the Black-Bourne Brook and the Langley Brook is poor. The WFD objective status of both water bodies is good by 2027. The WFD status and objectives of water bodies that are within the study area but are not crossed by the route are shown in Volume 5: Appendix WR-002-021.

[87] Environment Agency (2009), *River Basin Management Plan: Humber River Basin District*.

### *Abstractions and permitted discharges*

13.3.4 There are eight locations where surface water is abstracted within 1km of the Proposed Scheme in this area, according to data from the Environment Agency (details in Volume 5: Appendix WR-002-021)[88].

13.3.5 Information from Lichfield District Council indicates that there are no unlicensed abstractions form surface water used for potable supply in their records.

13.3.6 There is potential for further unlicensed abstractions to exist as a license is not required for abstractions volumes below 20 cubic metres per day.

13.3.7 Envirocheck data indicate that there are 25 current permitted surface water discharges within 1km of the Proposed Scheme in this area (details in Volume 5: Appendix WR-002-021).

Table 23: Surface water features potentially affected by the Proposed Scheme

| **Water feature** | **Location description (map reference[89])** | **Watercourse Classification[90]** | **WFD water body name and number and current overall status** | **WFD status objective (by 2027 as per Humber River Basin Management Plan (RBMP) unless stated)** | **Receptor value[91]** |
|---|---|---|---|---|---|
| Gallows Brook | East of Upper House Farm (SWC-CFA21-001) | Ordinary watercourse | Langley Brook from Middleton Hall Catchment to River Tame (GB104028046900)<br>Poor Status | Good Status | Moderate |
| Tributary of River Tame | Source to Trickley Coppice (SWC-CFA21-002) | Ordinary watercourse | | | Moderate |
| Tributary of River Tame | Crossing south of Shirrall Drive (SWC-CFA21-003) | Ordinary watercourse | | | Moderate |
| Pond | South of Shirrall Drive (SWC-CFA21-004) | Not applicable | Not applicable | Not applicable | Low |
| Pond | Barn Cottage (SWC-CFA21-005) | Not applicable | Not applicable | Not applicable | Low |
| Tributary of Bourne Brook | White House Farm (SWC-CFA21-006) | Ordinary watercourse | Black-Bourne Brook from source (confluence) to River Tame (GB104028047000)<br>Poor Status | Good Status | Moderate |
| Tributary of Bourne Brook | Roundhill Wood (SWC-CFA21-007) | Ordinary watercourse | | | Moderate |
| Tributary of Bourne Brook | Second crossing at Roundhill Wood (SWC-CFA21-008) | Ordinary watercourse | | | Moderate |

[88] Surface water abstractions for public supply are not included.
[89] Volume 5: Map Book – water resources, Maps WR-01-035 and WR-01-036.
[90] Water-feature classifications: Section 113 of the Water Resources Act 1991 defines a main river as a watercourse that is shown as such on a main river map. Section 72 of the Land Drainage Act 1991 defines an ordinary watercourse as "a watercourse that is not part of a main river". Section 221 of the Water Resources Act 1991 defines a watercourse as including "all rivers and streams, ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers) and passages through which water".
[91] For examples of receptor value, see Table 43 in the SMR Addendum Volume 5: Appendix CT-001-000/2.

| Water feature | Location description (map reference[89]) | Watercourse Classification[90] | WFD water body name and number and current overall status | WFD status objective (by 2027 as per Humber River Basin Management Plan (RBMP) unless stated) | Receptor value[91] |
|---|---|---|---|---|---|
| Black Brook | Bourne House (SWC-CFA21-009) | Main river | | | High |
| Fourteen further Ponds in addition to the two listed previously | Located within the land required for the construction and operation of the Proposed Scheme. | Not applicable | Not applicable | Not applicable | Low |
| Three further Ponds | Located outside of the land required for the construction and operation of the Proposed Scheme but within the zone of influence. | Not applicable | Not applicable | Not applicable | Low |

## Existing baseline – groundwater resources

### *Geology and hydrogeology*

13.3.8 The location of abstractions and geological formations are shown on Volume 5: Map Book – Water resources, Map WR-02-021.

13.3.9 A summary of the superficial and bedrock geology and hydrogeology is presented in Table 24. Unless otherwise stated, the geological groups listed are all crossed by the route.

Table 24: Summary of geology and hydrogeology in CFA21

| Geology | Distribution | Formation description | Aquifer classification | WFD water body and current overall status | WFD status objective (by 2027* as per RBMP) | Receptor Value[92] |
|---|---|---|---|---|---|---|
| **Superficial deposits** | | | | | | |
| Alluvium | Spatially limited deposits within the CFA associated with Gallows Brook and Black-Bourne Brook. | Clay, silt, sand and gravel | Secondary A aquifer | Not assessed by the Environment Agency. | Not assessed by the Environment Agency. | Moderate |
| Mid Pleistocene Till | Deposit located in the southern half of the study area. | Diamicton | Unproductive strata | Not assessed by the Environment Agency. | Not assessed by the Environment Agency. | Low |

[92] For examples of receptor value, see Table 43 in the SMR Addendum Volume 5: Appendix CT-001-000/2.

| Geology | Distribution | Formation description | Aquifer classification | WFD water body and current overall status | WFD status objective (by 2027* as per RBMP) | Receptor Value[92] |
|---|---|---|---|---|---|---|
| River Terrace Deposits 2 | Located in the south-east of the study area (will not be crossed by the route). | Sand and gravel | Secondary A aquifer | Not assessed by the Environment Agency. | Not assessed by the Environment Agency. | Moderate |
| River Terrace Deposits 3 | Located at the southern boundary of the study area. | Sand and gravel | Secondary A aquifer | Not assessed by the Environment Agency. | Not assessed by the Environment Agency. | Moderate |
| **Bedrock** | | | | | | |
| Bromsgrove Sandstone Formation | Underlies the northern extent of the study area. | Sandstones, commonly pebbly or conglomeratic at the bases of beds, interbedded siltstones and mudstones | Principal aquifer | Tame Anker Mease – PT Sandstone Birmingham Lichfield (GB40401G301000)<br>Poor Status | Good Status | High |
| Kidderminster Formation | Relatively small outcrop of Kidderminster Formation in the study area in the area of Weeford. | Pebble conglomerates and sandstones | Principal aquifer | Tame Anker Mease – PT Sandstone Birmingham Lichfield (GB40401G301000)<br>Poor Status | Good Status | High |
| Hopwas Breccia Formation | Several small outcrops of Hopwas Breccia Formation in the area of Hints in the centre of the study area. | Coarse breccia composed of locally derived material, limestone clasts and interbedded with sandstones and mudstones | Principal aquifer | Tame Anker Mease – PT Sandstone Birmingham Lichfield (GB40401G301000)<br>Poor Status | Good Status | High |
| Salop Formation (Enville Member) | Outcrops in the area of Hints in the centre of the study area. | Mudstone Sandstone, locally pebbly, and lenticular beds of conglomerate | Secondary A aquifer | Tame Anker Mease – PT Sandstone Birmingham Lichfield (GB40401G301000)<br>Poor Status | Good Status | Moderate |
| Mercia Mudstone Group | Underlies the southern half of the route in this study area. | Mudstones and subordinate siltstones | Secondary B aquifer | Tame Anker Mease – Secondary Combined (GB40402G990800)<br>Good Status | Good Status | Moderate |

* Year may vary in different RBMPs.

### *Superficial deposits*

13.3.10 Superficial geological deposits are located across the southern section of the route and consist of glacial till, river terrace deposits and localised alluvium associated with

the Black-Bourne Brook and Gallows Brook. They are absent from the majority of the remainder of the route.

13.3.11 The groundwater vulnerability of the Mid Pleistocene till is low, whilst the vulnerability of the groundwater within the superficial deposits forming the Secondary A aquifers is high. Groundwater, if present within the superficial aquifers, is assumed to be at shallow levels and likely to flow towards local rivers and streams.

### *Bedrock aquifers*

13.3.12 The Bromsgrove Sandstone Formation, Kidderminster Formation and Early Permian-Hopwas Breccia Formation are mainly composed of sandstone and conglomerates and are classified as Principal aquifers.

13.3.13 The Carboniferous Westphalian age Enville Member of the Salop Formation, composed of mudstones and sandstones, is classified as a Secondary A aquifer. The Mercia Mudstone Group is classified as a Secondary B aquifer.

13.3.14 Groundwater levels within the Principal and Secondary aquifers are unknown but are considered likely to be influenced by topography, in general, with flow towards rivers.

### *Water Framework Directive status*

13.3.15 No WFD classification has been given by the Environment Agency to the superficial deposits.

13.3.16 The overall WFD status of groundwater in the south-eastern half of the study area is Good; within the north-western half of the study area is overall of Poor status.

13.3.17 The reason for Poor Status is given in the RBMP for the Humber River Basin District, which states that: "The main reasons for Poor Status are high or rising nitrate concentrations with failures for pesticides and chemicals associated with mine workings. The main reason for poor quantitative status is that abstraction levels, mainly for drinking water, exceed the rate at which aquifers recharge".

13.3.18 The overall WFD status of groundwater in the study area is summarised in Table 24 and is largely classified as at risk, with overall Good Status.

### *Abstractions and permitted discharges*

13.3.19 The locations of licensed abstractions within the study area are shown in Volume 5: Appendix WR-002-021, Table 4. The locations are shown in Volume 5: Map WR-02-021.

13.3.20 The Environment Agency reports that there are five licensed groundwater abstractions located within the study area. Details are presented in Volume 5: Appendix WR-002-021.

13.3.21 Lichfield District Council has indicated that it has no records of unlicensed potable supplies within the study area.

13.3.22 There is the potential for further unlicensed abstractions to exist, as a licence is not required for abstraction volumes below 20 cubic metres per day.

13.3.23 A SPZ3 is designated where the Kidderminster Formation and the Bromsgrove Sandstone Formation Principal aquifers are present in the study area. This is in the

northern half of the study area Volume 5: Map Book – Water resources, Map WR-02-21). The abstraction to which it relates is located in the neighbouring Whittington to Handsacre CFA22.

13.3.24 Envirocheck reports that there are 19 current permitted discharges to groundwater within the study area.

### *Surface water/groundwater interaction*

13.3.25 Surface water/groundwater interaction is widespread throughout the study area in the form of springs, issues (generally a less defined area of rising groundwater than a spring), ponds, sinks, and watercourses. Locations of these features are detailed in Volume 5: Appendix: WR-002-021, Table 6.

13.3.26 Ponds which may potentially be affected by the Proposed Scheme are summarised in Table 23 and listed in full in Table 6 of Volume 5: Appendix: WR-002-021. These ponds are assumed to be in hydraulic connectivity with groundwater, unless further assessment suggests that the pond is situated upon low permeability strata, or lined with an impermeable layer.

### *Water-dependent habitats*

13.3.27 There are no areas with statutory ecological designations in relation to surface water or groundwater in the study area.

13.3.28 There are a number of potentially water-dependent ecological sites within the Drayton Bassett, Hints and Weeford area which are locally designated. These are detailed in Table 7 of Volume 5: Appendix WR-002-021 and include[93]:

- Black Brook Corridor: Black Brook Bridge – Heart of England Way; a Biological Alert Site (BAS);
- Moor Covert which is designated as a Site of Biological Importance (SBI) and within which a stream is shown on OS mapping; and
- Freeford Manor and Swinfen Park a Local Wildlife Site (LWS) which includes a lake and stream.

13.3.29 Further information on the ecological receptors is given in Section 7, Ecology.

## Existing baseline – flood risk

### *River flooding*

13.3.30 The agreed data set for river flooding is the Environment Agency Flood Zone mapping[94]. This mapping has been supplemented with the use of site-specific hydraulic modelling at locations where the Proposed Scheme will cross watercourses shown on Ordnance Survey mapping.

13.3.31 West of Drayton Bassett the route will cross the combined floodplain of two watercourses and the Proposed Scheme is on viaduct at this location. These two watercourses are minor tributaries to the River Tame with a combined catchment area

[93] Local wildlife sites in Staffordshire are called Sites of Biological Importance (SBI) and Biodiversity Alert Sites (BAS).
[94] Environment Agency, What's in your backyard: Risk of Flooding From Rivers and Sea, http://www.environment-agency.gov.uk/homeandleisure/37837.aspx, Accessed: 11 November 2013.

of 5km$^2$. The width of the modelled 1 in 100 (1%) annual probability event floodplain, allowing for climate change, is approximately 140m. In the vicinity of the Proposed Scheme the land use within the 1 in 100 (1%) annual probability event floodplain is agricultural and therefore less vulnerable (moderate value receptor).

13.3.32 The route is on viaduct crossing the Black Brook as it flows between Weeford and Hints. The Black Brook is a more significant tributary of the River Tame, with a catchment area of 86km$^2$. The width of the modelled 1 in 100 (1%) annual probability event floodplain, allowing for climate change, is approximately 125m. Within the 1 in 100 (1%) annual probability event floodplain, on the south bank of the Black Brook, there is a residential property that could potentially be affected by the Proposed Scheme. This property is classified as more vulnerable (high value receptor).

13.3.33 The Environment Agency Mapping, Lichfield Strategic Flood Risk Assessment (SFRA)[95], the Staffordshire Preliminary Flood Risk Assessment (PFRA)[96] indicate that there have been no historical incidents of river flooding within the study area.

### *Surface water flooding*

13.3.34 The agreed data set for surface water flooding is contained in the Environment Agency Flood Maps for Surface Water (FMfSW), as shown on Volume 5: Maps WR-01-035 and WR-01-036.

13.3.35 These maps have been reviewed and form the basis of the assessment of the impact on the risk of surface water flooding.

13.3.36 The FMfSW show the effects of two rainfall events, the 1 in 30 (3.3%) and the 1 in 200 (0.5%) annual probability. The areas susceptible to surface water flooding during the 1 in 200 (0.5%) annual probability event are shown on Volume 5: Maps WR-01-035 and WR-01-036. The maps show areas currently at risk of surface water flooding and where surface water is generally collected in rural low points in topography such as following open drainage channel networks associated with the watercourses in the area.

13.3.37 Nine areas identified to be at risk of surface water flooding are classed to be at a high risk. The areas at risk of surface water flooding can be categorised into three types:

- areas associated with existing watercourses;
- overland flow paths; or
- isolated areas (e.g. low spots where water collects).

13.3.38 The main area at risk from surface water flooding is associated with Black Brook. Other areas at risk from surface water flooding are associated with Gallows Brook, the tributaries of the River Tame and the tributaries of Bourne Brook.

13.3.39 In this study area there are three locations where overland flow paths are evident on the Environment Agency FMfSW that do not follow a watercourse. The first is located to the west of Hints (Volume 5: Map WR-01-035), the second is located between the

[95] Lichfield District Council (2008), *Level 1 Strategic Flood Risk Assessment for Local Development Framework*.
[96] Staffordshire County Council (2011), *Staffordshire Preliminary Flood Risk Assessment*. Completed by Royal Haskoning on behalf of Staffordshire County Council.

A5 crossing and the Flats Lane crossing (Volume 5: Map WR-01-035), and the third is located north of Horsley Brook Farm (Volume 5: Map WR-01-035).

13.3.40 The Environment Agency Mapping, Lichfield SFRA[95], the Staffordshire PFRA[96] indicate that there have been no historical incidents of sewer flooding within 1km of the route. However a flood event, for which the source and date is unknown, has been reported in close proximity to Oak Farm. Owing to the location of this event, this flooding could potentially have been from surface water.

### *Sewer flooding*

13.3.41 The agreed data sets for sewer flooding are the Lichfield SFRA[95], the Staffordshire PFRA[96]. In this study area Severn Trent Water asset mapping has also been used.

13.3.42 The Proposed Scheme is not considered to be at risk from the sewer network, as there are no known locations in this study area where the Proposed Scheme will cross or be located in close proximity to the sewer network.

13.3.43 The Environment Agency Mapping, Lichfield SFRA[95], and the Staffordshire PFRA[96] indicate that there have been no historical incidents of sewer flooding within 1km of the route. However a flood event, for which the source and date is unknown, has been reported in close proximity to Oak Farm. Owing to the location of this event, this flooding could potentially have been from the sewer network.

### *Artificial water bodies*

13.3.44 The agreed data set for flooding from reservoirs is the Environment Agency Reservoir Inundation Map[97] as shown in Maps WR-01-35 and WR-01-036. OS mapping has been used to confirm that there are no canals within the study area.

13.3.45 Flooding from artificial systems may occur from failure of a retaining structure that impounds. Reservoirs are the only manmade features that have been identified within the FRA (see Volume 5: Appendix WR-003-021).

13.3.46 There are three water bodies that are listed in the Environment Agency Reservoir Inundation Flood Map as posing a flood risk to the Proposed Scheme. These reservoirs, Canwell Estate Reservoir, Chasewater (Cannock Chase) and Little Aston Pool, pose a risk at two locations. However, the data provided does not indicate flood depths, flow velocities or the time taken for onset of flooding after a breach takes place.

13.3.47 The route crosses the two tributaries of the River Tame, which is likely to act as a flow path for reservoir flooding from Canwell Estate reservoir. The route also crosses Black Brook, which is likely to act as a flow path for reservoir flooding from Chasewater (Cannock Chase) or Little Aston Pool. At both these locations the inundation extent covers a greater extent than the flood zone mapping.

13.3.48 Due to the strict regulations and high level of maintenance associated with reservoirs, breaching is considered very unlikely and the works associated with the Proposed Scheme will not increase the risk of failure. The Proposed Scheme will not increase

[97] Environment Agency. What's in your backyard? Risk of flooding from reservoirs. http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=reservoir. Accessed October 2013.

the risk of flooding from this source, therefore the risk from this source of flooding is categorised as low.

13.3.49 The Environment Agency Mapping, Lichfield SFRA[95] and the Staffordshire PFRA[96] indicate that there have been no historical incidents of reservoir or canal flooding either at the location of the route or within 1km of the route within the study area.

### *Groundwater flooding*

13.3.50 Lichfield District Council's Level 1 SFRA[95] states that there have been no observed or recorded incidences of groundwater flooding. Therefore, the risk of flooding from this source is considered low.

## Future baseline

13.3.51 Volume 5: Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the baseline for the operation of the Proposed Scheme. The potential cumulative effects arising from committed developments in relation to water resources and flood risk have been considered as part of this assessment of the construction and operation of the Proposed Scheme.

13.3.52 All committed developments are required to comply with the NPPF[98], development plans and other legislation and guidance. As such committed developments are not expected to have a material effect on the water resources and flood risk baseline.

13.3.53 WFD future status objectives are set out in Table 23 and Table 24. This potential change in baseline is not considered to result in significant changes to the reported effects from the Proposed Scheme.

13.3.54 For the reasons stated above for construction, the cumulative development will not result in a change in significance of the effects from operation of the Proposed Scheme.

### *Climate change*

13.3.55 Current projections to the 2080s indicate that climate change may affect the future baseline against which the impacts of the Proposed Scheme on surface water and groundwater resources have been assessed. There may be changes in the flow and water quality characteristics of surface water and groundwater bodies as a result of changes in climate. However, except for flood flows described in this section, these changes are not considered to result in the reported effects from the Proposed Scheme changing in significance.

13.3.56 Current projections indicate that there will be more frequent, higher intensity rainfall events in the future. The probability and severity of surface water flooding could therefore increase, as surface water drainage systems fail to cope with more frequent, higher intensity storms. Peak river flows during flood events are expected to increase, potentially causing greater depths and extents of flooding.

[98] Department for Communities and Local Government (2012), *National Planning Policy Framework*.

13.3.57 When considering the influence that climate change may have on the future baseline, against which impacts that the Proposed Scheme on flood risk has been evaluated, the assessment has used the recommended precautionary sensitivity ranges of key parameters, as given in Table 5 in the Technical Guidance to the NPPF. The sensitivity testing undertaken more than allows for variations in climate change factors included in other national guidance.

13.3.58 Further information on the potential additional impacts of climate change for water resources and flood risk is provided in Sections 7 and 8 of Volume 1 and Volume 5: Appendix CT-009-000.

## 13.4 Effects arising during construction

### Avoidance and mitigation measures

13.4.1 The general approach to mitigation is set out in Volume 1.

13.4.2 The following measures will reduce potentially significant adverse effects on water resources and flood risk to levels that will not be significant. Further details are shown in Volume 5: Appendices WR-002-021 and WR-003-021.

13.4.3 It is proposed to culvert watercourses in three places:

- a section of Gallows Brook east of Upper House Farm (Volume 5: Map WR-01-035, SWC-CFA21-001);
- a section of a tributary of Bourne Brook at White House Farm (Volume 5: Map WR-01-035, SWC-CFA21-006); and
- a further tributary of Bourne Brook at Roundhill Wood (Volume 5: Map WR-01-035, SWC-CFA21-007 and 008).

13.4.4 Culvert lengths will be minimised and will be designed with invert levels below the firm bed to negate the impact on flows and sediment transfer. Where there is loss of length due to straightening or realignment (for example of a tributary of the Bourne Brook at Roundhill Wood), the aim, where possible, will be to offset this by increasing channel length up or downstream of the culvert to at least match the lost length of channel. Culverts will be designed in line with Construction Industry Research and Information Association (CIRIA)[99] and Environment Agency guidance and in consultation with the Environment Agency. The mitigation specifically for the ecology of the watercourses is considered in Section 7, Ecology.

13.4.5 Consideration will be given to the detailed design to the objectives of the WFD as described in the RBMP. This may include the use of soft engineering solutions for bank design, and the inclusion of natural forms such as berms or incorporation of a two-stage channel, riffles and pools and marginal planting, where reasonably practicable.

13.4.6 Discharges of rainfall run-off from the route will be predominantly restricted with balancing ponds to emulate the existing environment by reducing runoff to greenfield rates where reasonably practicable. The balancing ponds, shown on Volume 2: CFA21

[99] Construction Industry Research and Information Association (2010), *C689 Culvert Design and Operation Guide.*

Map Book, Map series CT-06, will be designed where practicable to discharge at greenfield run-off rates and will accommodate for events up and including the 1 in 100 annual probability (1%) including an allowance for climate change.

13.4.7 Realignments of four minor roads (Shirrall Drive, Drayton Lane, Bangley Lane, and Flats Lane) are required as part of the scheme in the study area. overbridges are also required on three major roads (the A5, the A51 Tamworth Road and the A453 Sutton Road). The watercourses that will receive run-off from these roads are:

- a tributary of the River Tame (Volume 5: Map WR-01-035, SWC-CFA21-003) to which it is assumed Shirrall Drive, Drayton Lane and the A453 Sutton Road outfall;
- a drain which feeds into a tributary of Bourne Brook to which it is assumed Bangley Lane outfalls;
- Black Brook itself (Volume 5: Map WR-01-035, SWC-CFA21-009) to which it is assumed the A5 outfalls; and
- unnamed drains which ultimately feed into Fisherwick Brook (which is not within this CFA) to which it is assumed Flats Lane and the A51 Tamworth Road outfall.

13.4.8 Appropriate sustainable drainage mitigation will be provided for minor roads to address the risks to the receiving watercourses (for both flow and water quality) and will be selected using the Design Manual for Roads and Bridges (particularly HA103/06)[100] and CIRIA[101] guidance. For the major roads (identified through the application of the SMR), detailed assessments will be made using the guidance from the Design Manual for Roads and Bridges through the detailed design phase. Initial assessments using the Highways Agency Water Risk Assessment Tool (HAWRAT) are shown in Volume 5: Appendix WR-002-021.

13.4.9 Two viaducts, Drayton Bassett viaduct and Black Brook viaduct, are located within this area. These avoid the requirement for culverts and reduce the built footprint in the floodplain and, therefore, allow the watercourses to remain within their existing channels.

13.4.10 Moor Covert is located in the north of the study area and could have potentially have been affected by dewatering. However, the vertical alignment is now such that dewatering will not be needed.

13.4.11 Culverts have been designed to accommodate the flows from the 1 in 100 (1%) annual probability event including allowance for climate change.

13.4.12 Where the Proposed Scheme will interrupt surface water flow paths, the drainage will be designed to intercept and manage this water. This will be achieved through collecting water prior to being discharge to the associated watercourse, with flow balancing provided if needed. This will allow the water to follow a similar path to the existing situation.

[100] DMRB, Volume 4 Section 2.
[101] CIRIA (2006), *c648 Control of Water Pollution from Linear Construction Projects*.

13.4.13 Sustainable drainage systems (SuDS) and infiltration trenches are to be put in place to facilitate recharge to the groundwater to help maintain groundwater levels within the Principal and Secondary aquifers, and mitigate impacts on springs, issues and ecological receptors. These SuDS and infiltration trenches will be located in areas where gravity transfer is achievable, having due regard to Environment Agency guidelines[102].

13.4.14 Replacement floodplain storage will be provided to mitigate the impact of the Proposed Scheme on river flood risk. At the Black Brook crossing, modelling has indicated that replacement floodplain storage can be provided upstream of this structure to reduce the change in flood risk.

13.4.15 Section 16 of the draft Code of Construction Practice (CoCP) sets out the measures and standards of work that will be applied to the construction of the Proposed Scheme (see Volume 5: Appendix CT-003-000). It will provide effective management and control of the impacts during the construction period.

13.4.16 The following measures in Section 16 of the draft CoCP will reduce potentially significant adverse effects during construction on water resources and flood risk to levels that will not be significant:

- stationary plant will be used with secondary containment measures such as plant nappies to retain any leakage of oil or fuel and reduce the risk of surface water or groundwater pollution;
- spill kits shall also be provided where appropriate such as the 14 worksites, Drayton Lane auto-transformer station and Flats Lane auto-transformer station to reduce the risk of surface water or groundwater pollution;
- the use of oil interceptors, if required by the Environment Agency, at site offices and work compounds;
- appropriate measures such as the use of bunds of non-erodible material and silt or sediment fences adjacent to watercourses such as Black-Bourne Brook;
- implementing a surface water or groundwater monitoring plan, particularly in relation to works which may affect aquifers, for example excavations and piling; and
- contractors are also required to monitor and manage other extreme weather events which may affect water resources during construction.

13.4.17 In accordance with the draft CoCP, Section 16, monitoring will be undertaken in consultation with the Environment Agency prior to, during and after construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.

13.4.18 Measures defined in the draft CoCP, including detailed method statements, will ensure that there will be no effect on surface water quality or flows associated with

[102] Environment Agency (2013), *Groundwater: Protection: Principles and Practice*.

construction; this will include release to surface waters sewers in the surrounding receptors, principally the Severn Trent Water sewer network.

13.4.19 Measures defined in the draft CoCP will avoid an increase in river flood risk through constricting and altering flood flow paths.

13.4.20 There are four construction compounds within this CFA study area which are located in areas at risk from surface water flooding. Whilst overland flow routes may be altered by the presence of the construction compounds, the drainage system will collect and manage overland flow preventing a risk to the temporary works and adjacent areas. In addition, all sites have the potential to increase flood risk from this source due to reduced infiltration capacity of the ground during construction. Surface water runoff from the construction compounds will be effectively attenuated and discharged at a controlled rate (as described in the draft CoCP Section 16) such that the effects on surface water flooding will be negligible.

## Assessment of impacts and effects

13.4.21 This section describes the significant effects following the implementation of avoidance and mitigation measures.

13.4.22 Further details of the potential impacts that will have insignificant effects are provided in the Water Resources Assessment report in Volume 5: Appendix WR-002-021 and Flood Risk Assessment in Volume 5: Appendix WR-003-021.

13.4.23 An assessment of the impact on the WFD status is detailed within the WFD Compliance Assessment, contained within the route-wide Water Resources appendix (Volume 5: Appendix WR-001-000).

13.4.24 It is not considered that projected climate change effects, combined with the effects from the construction of the Proposed Scheme, will alter the significance of any of the reported effects on surface water, groundwater and water-dependent habitats (see Volume 3: Route-wide Effects Assessment for further information).

### *Temporary effects*

#### Surface water

13.4.25 The assessment shows that there will be no significant temporary adverse effects on surface water resources during the construction period.

13.4.26 As no significant effects on surface water features have been identified in the assessment, no significant adverse effects on abstractions or discharges will arise.

#### Groundwater

13.4.27 The assessment shows that there will be no significant adverse effects on groundwater, abstractions and permitted discharges, or surface water/groundwater interaction.

13.4.28 The assessment shows that there will be no temporary significant effects are anticipated to water-dependent habitats.

#### Flood risk

13.4.29 The assessment has identified no significant increase in risks resulting from all sources of flood risk during the construction process and therefore no significant temporary effects will arise.

### *Cumulative effects*

13.4.30 There are no committed developments that have been identified which will result in significant cumulative temporary effects.

### *Permanent effects*

#### Surface water

13.4.31 The assessment shows that there will be no permanent significant effects on surface water features from assets constructed for the Proposed Scheme.

13.4.32 Further details of the assessment, including the determination of the potential impacts that will not have significant effects are provided in Volume 5: Appendix WR-002-021.

13.4.33 As no permanent significant effects on surface water features have been identified, no significant effects on abstractions or discharges will arise.

#### Groundwater

13.4.34 The assessment shows that there will be no permanent significant effects on groundwater, licensed abstractions and permitted discharges, or on surface water/groundwater interaction.

13.4.35 The assessment shows that there will be no likely permanent significant effects on water-dependent habitats.

#### Flood risk

13.4.36 The assessment shows that there will be no permanent adverse significant effects on flood risk as a result of the Proposed Scheme.

13.4.37 Further details of the assessment, including the determination of the potential impacts that will not have significant effects are provided in Volume 5: Appendix WR-003-021.

### *Cumulative effects*

13.4.38 No committed developments have been identified that will result in significant cumulative permanent effects.

## Other mitigation measures

13.4.39 No other mitigation measures are envisaged for surface water, groundwater or flooding.

## Summary of likely residual significant effects

13.4.40 The assessment shows that there will be no significant residual effects on surface water, groundwater or flood risk during the construction period.

## 13.5 Effects arising from operation

### Avoidance and mitigation measures

13.5.1 Generic examples of design measures that will reduce potentially significant adverse effects on the quality and flow characteristics of surface water courses and groundwater bodies during operation and management of the Proposed Scheme are described in Volume 1.

13.5.2 The sustainable drainage solutions used for drainage from the Proposed Scheme (such as balancing ponds) may have an additional benefit of providing some treatment for water quality of the runoff before it is discharged into the environment. Generic examples of management measures during operation and management of the Proposed Scheme that will reduce potentially significant adverse effects on the quality and flow characteristics of surface water courses and groundwater bodies are described in Volume 1 and in the draft operation and maintenance plan for water resources and flood risk included in Volume 5 Appendix WR-001-000. Operation and management of the Proposed Scheme is not likely to have a significant adverse effect on flood risk anywhere in the catchments through which it passes. Generic examples of management measures that may mitigate flood risk are described in Volume 1.

### Assessment of impacts and effects

13.5.3 There are considered to be no significant adverse effects to surface water, groundwater or flood risk arising from operation of the Proposed Scheme.

### Other mitigation measures

13.5.4 There are considered to be no further measures required to mitigate adverse effects on surface water resources, groundwater resources or flood risk.

# 14 References

British Standard BS1017 (2011), *Investigation of Potentially Contaminated Sites.*

CIRIA (2006), *c648 Control of Water Pollution from Linear Construction Projects*.

Construction Industry Research and Information Association (2010), *C689 Culvert Design and Operation Guide C689*.

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

Criteria 1-5 of Schedule One, Part II of the *1997 Hedgerow Regulations*.

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

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

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

Defra (2011), *The Natural Choice: securing the value of nature.*

Defra; 2010 Based Background Maps for NOx, NO2, PM10 and PM2.5; http://laqm.defra.gov.uk/maps/maps2010.html; Accessed July 2013.

Department for Communities and Local Government (2012), *National Planning Policy Framework*.

Directive 200/60/EC of the European Parliament and of the Council of 23 October 2000.

DMRB (2006), Volume 4 Section 2 Part 1 Vegetative Treatment Systems for Highway Run-off (HA103/06).

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

Environment Agency (2013), *Groundwater: Protection: Principles and Practice*.

Environment Agency (2009), *River Basin Management Plan: Humber River Basin District*.

Environment Agency. What's in your backyard? Risk of flooding from reservoirs. http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=reservoir. Accessed October 2013.

Gregory RD, Wilkinson NI, Noble DG, Robinson JA, Brown AF, Hughes J, Proctor DA, Gibbons DW and Galbraith CA (2002), The population status of birds in the United Kingdom, Channel Islands and the Isle of Man; an analysis of conservation concern 2002-2007. *British Birds* 95: 410-450.

Hawksford, J. E. (2013). A Checklist of the Flora of Staffordshire.

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

Hollis, John (2001), *Soils in Staffordshire IV Sheet SK00/10 (Lichfield)*; Rothamsted Experimental Station.

http://www.environment-agency.gov.uk/homeandleisure/37837.aspx.

Institute of Air Quality Management (2011), *Guidance on the assessment of the impacts of construction on air quality and the determination of their significance.*

Lichfield District Council (2008), *Level 1 Strategic Flood Risk Assessment for Local Development Framework*.

Lichfield District Council (2012), *Lichfield District Local Plan – Our Strategy, July 2012 (Proposed Submission) and Schedule of Proposed Modifications to the Local Plan: Strategy Proposed Submission March 2013*.

National Planning Practice Guidance – Noise http://planningguidance.planningportal.gov.uk.

National Soil Resources Institute (1999), *Land Information System*. Cranfield University.

*Natural Environment and Rural Communities Act 2006* (Chapter 16). London, Her Majesty's Stationery Office.

Office for National Statistics (ONS) (2012), *UK Business: Activity, Size and Location 2011, ONS, London*. Please note 2011 data has been used to provide an appropriate comparison with 2011 Census data.

ONS (2012), Business Register and Employment Survey 2011, *ONS, London*. Note – 2011 BRES data has been used to provide an appropriate comparison with 2011 Census data.

ONS (2012), *Census 2011*, ONS, London.

Section 113 of the *Water Resources Act 1991*.

Section 221 of the *Water Resources Act 1991*.

Section 72 of the *Land Drainage Act 1991*.

Shirt, David (1987); *British Red data Books: 2. Insects*; Nature Conservancy Council; Peterborough. Red Data Book category 2 – Vulnerable: Species declining throughout their range or in vulnerable habitats.

Soil Survey and Land Research Centre, *The Soil Survey Field Handbook*.

Staffordshire and Stoke-on-Trent Councils (1999), *Staffordshire and Stoke-on-Trent Minerals Local Plan 1994-2006*.

Staffordshire County Council (2000), *Supplementary Planning Guidance 'Planning for Landscape Change'*.

Staffordshire Wildlife Trust (2011), *Guidelines for the Selection of Sites of County Biological Importance in Staffordshire*. February 2008, Version 4.02 (May 2011).

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

*The Hedgerows Regulations 1997* (1997 No. 1160). London, Her Majesty's Stationery Office.

*The Noise Insulation (Railways and Other Guided Transport Systems) Regulations* (1996). London, Her Majesty's Stationery Office.

Wray S, Wells D, Long E and Mitchell-Jones T. (2010), Valuing bats in ecological impact assessment. In Practice. December 2010. P23-25.