

## **High Speed Rail (West Midlands - Crewe)**

Supplementary Environmental Statement 2 and  
Additional Provision 2 Environmental Statement

Volume 1

Introduction and methodology

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## Department for Transport

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

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# Preface

This document is Volume 1 of the Supplementary Environmental Statement 2 (SES2) and the Additional Provision 2 Environmental Statement (AP2 ES) for Phase 2a of High Speed Two (HS2). Phase 2a is the western section of Phase Two between the West Midlands and Crewe.

The SES2 and the AP2 ES are being deposited as supplementary environmental information under Private Business Standing Order 224A of the House of Commons and Standing Order 83A of the House of Lords (Comments on environmental statement).

The SES2 and the AP2 ES have been prepared by persons who have sufficient expertise to ensure the completeness and technical quality of the statements. Further detail is provided in the HS2 Phase 2a: West Midlands - Crewe SES2 and AP2 ES Competency Statement available online at [www.gov.uk/hs2](http://www.gov.uk/hs2).

The SES2 and the AP2 ES will each be the subject of a public consultation in accordance with Parliamentary procedure. Members of the public will have a period of at least 42 days within which to make representations following the deposit of the SES2 and AP2 ES in Parliament and the first publication of the necessary newspaper notices that follows.

# Structure of the Supplementary Environmental Statement 2 and the Additional Provision 2 Environmental Statement

This report is part of the suite of documents that make up the Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES) for Phase 2a of the High Speed Two (HS2) rail network between the West Midlands and Crewe. The SES2 and the AP2 ES are separate documents, however, they are bound together and presented in a number of volumes described below and shown in Figure 1:

- Non-technical summary (NTS). This provides a summary in non-technical language of the SES2 (Part 1) and the AP2 ES (Part 2). It presents a summary of any likely residual significant environmental effects (i.e. effects which are likely to remain after mitigation measures are put in place), both beneficial and adverse, which are new or different to those reported in the Environmental Statement (ES) submitted to Parliament in July 2017 in support of the hybrid Bill for Phase 2a of HS2 ('the main ES'), as amended by the SES1 and, where relevant, the AP1 ES;
- Glossary of terms and list of abbreviations. This contains any new or different terms and abbreviations used throughout the SES2 and the AP2 ES which are not already explained in the main ES or the SES1 and AP1 ES;
- Volume 1: Introduction to the SES2 and the AP2 ES. This introduces the supplementary environmental information and changes to the design and construction assumptions included within the SES2 and amendments within the AP2 ES. The report explains the EIA process which has been applied;
- Volume 2: Community area reports and map books. These report the supplementary environmental information and changes to the design and construction assumptions included within the SES2 (Part 1), amendments within the AP2 ES (Part 2) and any new or different likely significant environmental effects arising from these changes and amendments in each community area. These effects are compared to those reported in the main ES, as amended by the SES1 (and by the SES2 for the AP2 amendments). The AP1 amendments are also taken into account where relevant. The maps relevant to each community area are provided in separate Volume 2 map books and should be read in conjunction with the relevant community area report;
- Volume 3: Route-wide effects. This describes any new or different likely significant environmental effects arising at a route-wide level from the supplementary environmental information and changes to the design and construction assumptions included within the SES2 (Part 1) and the amendments within the AP2 ES (Part 2) compared to those reported in the main ES, as amended by the SES1 (and by the SES2 for the AP2 amendments). The AP1 amendments are also taken into account where relevant; and
- Volume 5: Appendices and map book. These contain supporting environmental information and associated maps.

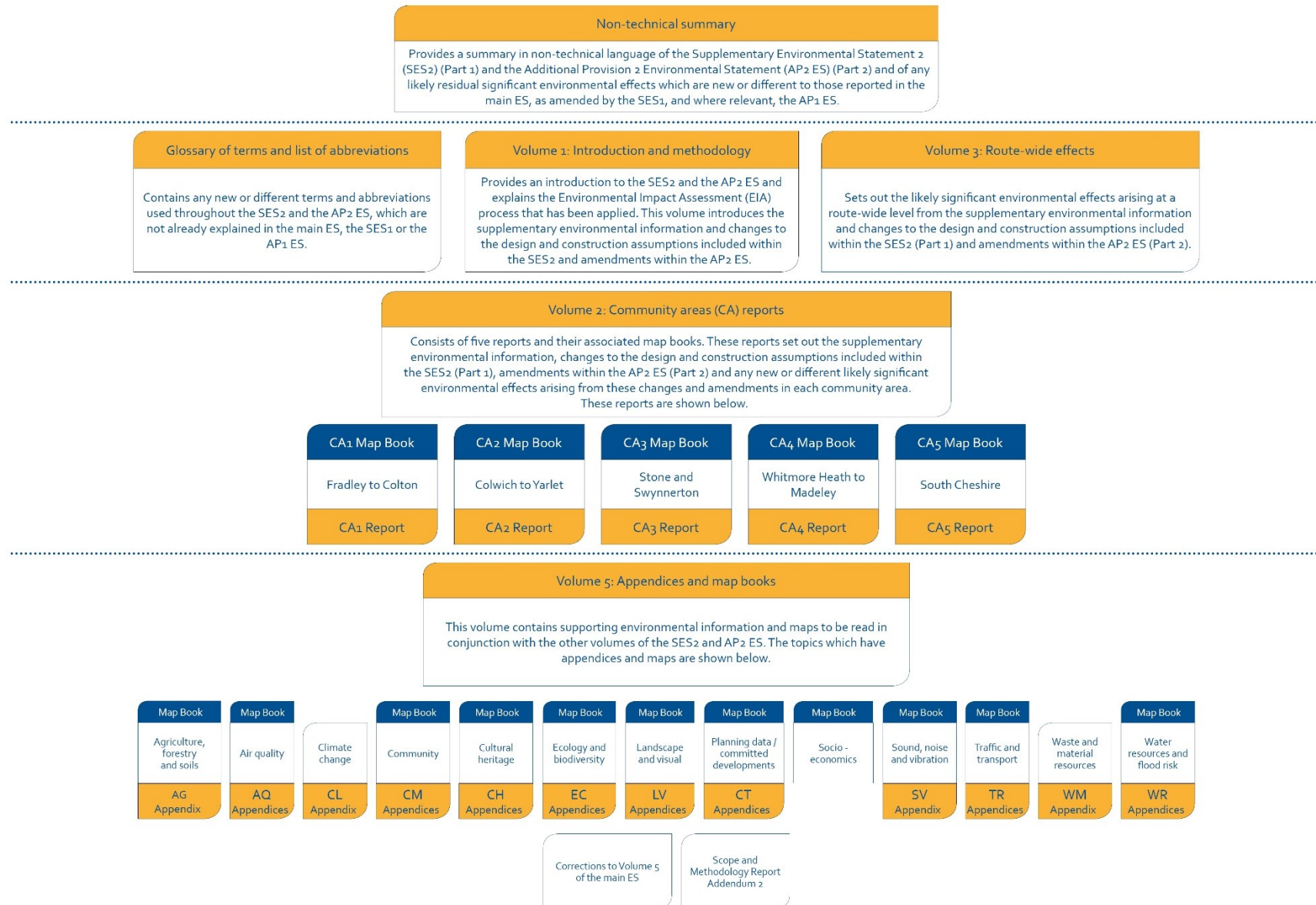
A Volume 4: Off-route effects report was produced as part of the main ES. This assessed the likely significant effects of the scheme at locations beyond the Phase 2a route corridor and its immediate environment. A separate Volume 4 has not been produced as part of the SES2 and AP2 ES. Any new or different significant off-route effects arising from the AP2 amendments are reported in the most relevant Volume 2 community area report.

Certain reports and maps containing background information and data (BID) have been produced, which do not form part of the SES2 and AP2 ES. These documents are available online at [www.gov.uk/hs2](http://www.gov.uk/hs2). The BID documents and maps present background survey information and other relevant background material.



# SES2 and AP2 ES - Volume 1: Introduction and methodology

Figure 1: Structure of the SES2 and AP2 ES



# 1 Introduction

## 1.1 Background to High Speed Two Phase 2a and the need for the SES2 and AP2 ES

- 1.1.1 The High Speed Rail (West Midlands - Crewe) Bill ('the Bill') was submitted to Parliament together with an Environmental Statement (ES) ('the main ES') in July 2017. If enacted by Parliament, the Bill will provide the powers to construct, operate and maintain Phase 2a of HS2.
- 1.1.2 This phase of HS2 will provide the western section of Phase Two between the West Midlands and Crewe, comprising approximately 36 miles (58km) of HS2 route (including the section which would connect with and form the first part of Phase 2b) and two spurs (approximately 4 miles (6km)) south of Crewe that will allow trains to transfer between the HS2 route and the existing West Coast Main Line (WCML). The remainder of Phase Two, between Crewe (where it would connect with Phase 2a south of Crewe Station) and Manchester, and between the West Midlands and Leeds will be the subject of a separate hybrid Bill.
- 1.1.3 Following the deposit of the Bill, the need for a number of amendments to the scheme (i.e. changes that require amendments to the Bill) was identified. These amendments were promoted in Parliament in March 2018 through an Additional Provision (referred to hereafter as 'AP1'), together with an ES ('the AP1 ES'). The AP1 ES was accompanied by a Supplementary ES ('the SES1'), which reported changes to the design which do not require amendments to the Bill, changes to construction assumptions, new environmental baseline information and corrections to the main ES.
- 1.1.4 Since the submission of the SES1 and AP1 ES, the need for further changes to the design and construction assumptions has been identified. New environmental baseline information has also become available and the need for a number of further corrections to the main ES has been identified. Any new or different significant effects that are likely to result from these changes, where these do not require amendments to the Bill, are reported in the SES2.
- 1.1.5 Changes to the Bill are needed in order to make further amendments to the original proposals and these require the submission of a second Additional Provision ('AP2'). Some of the AP2 amendments alter certain of the proposals within AP1. The AP2 ES reports on the likely significant environmental effects of these amendments, having taken into account the environmental information in the SES2.
- 1.1.6 These amendments and design changes have arisen through the Select Committee process, ongoing discussions with stakeholders and as a result of design refinements.
- 1.1.7 The SES2 and the AP2 ES are separate environmental statements, but have been produced as combined volumes. Both the SES2 and AP2 ES provide an update to the main ES, as amended by the SES1 and, where relevant, the AP1 ES, and should be read in conjunction with them. The SES2 is presented first, and the AP2 ES follows and bases its comparison upon effects reported in the main ES, as amended by the SES1 and SES2. The assessment also reports the likely significant cumulative effects, taking into account the AP1 amendments.

## 1.2 Terminology used to describe the scheme

1.2.1 In order to differentiate between the original scheme and the subsequent changes, the following terms are used:

- 'the original scheme' – the Bill scheme submitted to Parliament in July 2017, which was assessed in the main ES;
- 'the SES1 scheme' – the original scheme with the changes described in the SES1 submitted in March 2018;
- 'the AP1 revised scheme' – the SES1 scheme as amended by the AP1 submitted in March 2018;
- 'the SES2 scheme' – the SES1 scheme with the changes described in the SES2; and
- 'the AP2 revised scheme' – the SES2 scheme as amended by the AP2.

1.2.2 The following terms are used to differentiate between changes included in the SES2 and those included in the AP2 ES:

- 'SES2 design changes' – changes to the scheme design reported in the SES2 that do not require additional powers;
- 'SES2 changes' – all changes reported in the SES2 that do not require additional powers. These may include new baseline information, changes to the design and construction assumptions, and corrections; and
- 'AP2 amendments' – amendments to the scheme reported in the AP2 ES that include requirements for additional powers in the Bill.

1.2.3 In addition, the following terms are also used in the SES2 and AP2 ES, where relevant:

- 'SES1 design changes' – changes to the scheme design reported in the SES1 that do not require additional powers;
- 'SES1 changes' – all changes reported in the SES1 that do not require additional powers. These may include new baseline information, changes to the design and construction assumptions, and corrections; and
- 'AP1 amendments' – amendments to the scheme reported in the AP1 ES that include requirements for additional powers in the Bill.

## 1.3 Structure of this volume

1.3.1 The remainder of this report is structured as follows:

- Section 2: introduction to the SES2, outlining the approach to:
  - new and updated environmental baseline information;
  - changes to the design and construction assumptions within the existing powers of the Bill, including a summary of the main changes; and
  - corrections to the main ES and the SES1;

## SES2 and AP2 ES - Volume 1: Introduction and methodology

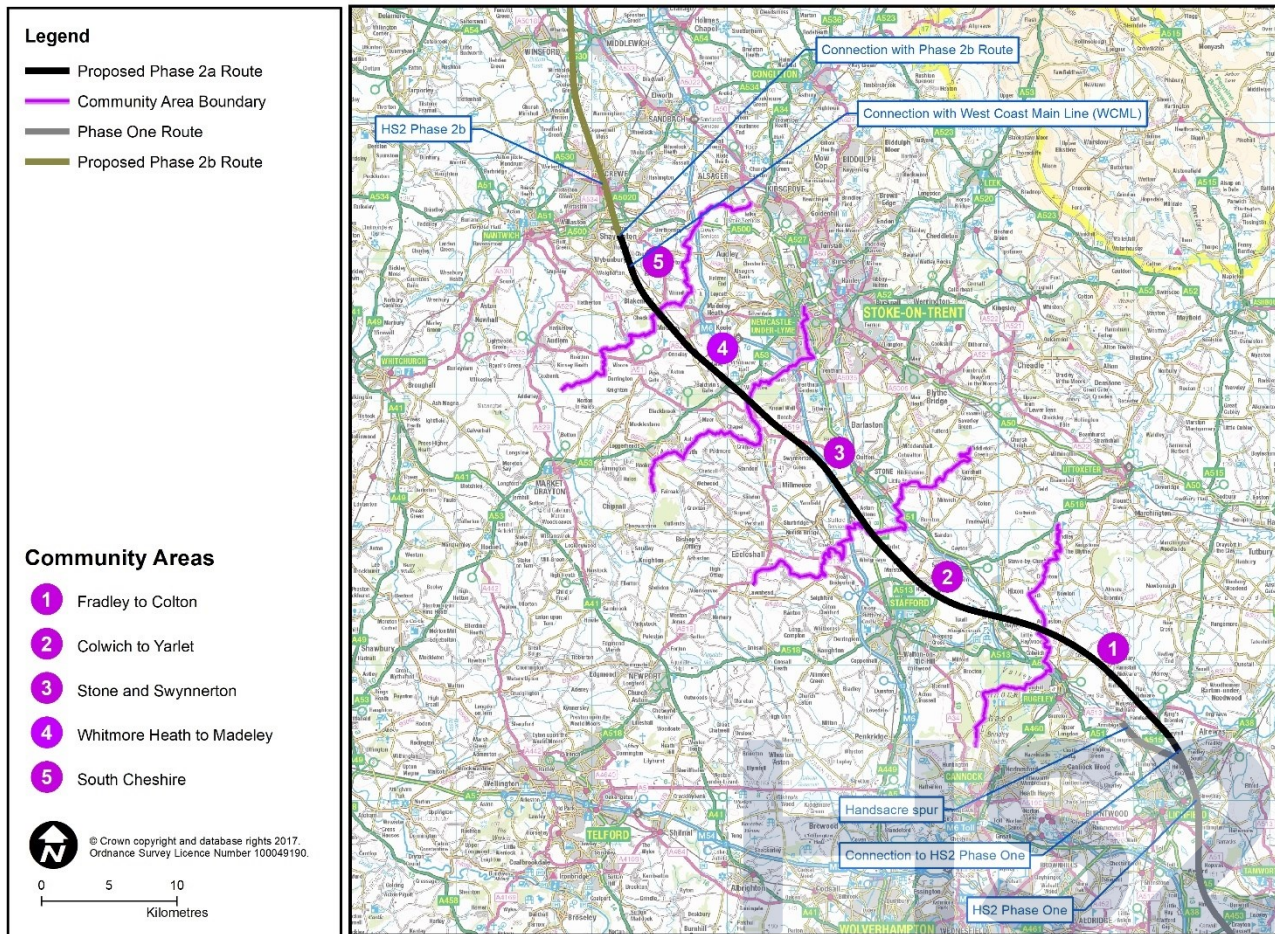
- Section 3: introduction to the AP2 amendments and the AP2 ES, including a summary of the main changes;
- Section 4: scope and methodology of the SES2 and the AP2 ES. The section outlines the approach applied to the environmental assessment of the changes and amendments contained within the SES2 and the AP2 ES, including the scope, methodology, assumptions and limitations to the assessment of environmental effects;
- Section 5: approach to the appendices within the SES2 and the AP2 ES;
- Section 6: approach to mapping within the SES2 and the AP2 ES;
- Section 7: approach to mitigation and monitoring associated with the SES2 and the AP2 ES; and
- Section 8: consultation on the SES2 and the AP2 ES.

1.3.2 Figure 2 shows the community areas along the route.



# SES2 and AP2 ES - Volume 1: Introduction and methodology

Figure 2: Phase 2a route showing community areas



## 2 Introduction to the SES2

### 2.1 Introduction

2.1.1 The SES2 presents an assessment of any new or different likely significant environmental effects, compared to those reported in the main ES as amended by SES1, that result from:

- updated and new environmental baseline information;
- changes to the design and construction assumptions of the scheme that do not require amendments to the Bill; and
- corrections relating to information within the main ES and the SES1.

### 2.2 Updated/new environmental baseline information

2.2.1 Since the production of the SES1 and AP1 ES, updated and new environmental baseline information has become available from surveys and desk based research. This includes additional information concerning the environmental conditions for the following environmental topics:

- air quality: measurements for the baseline year of 2016 and revised road vehicle emission factors produced by the Department for Environment, Food and Rural Affairs (Defra), as described below, have become available;
- cultural heritage: additional geophysical surveys and heritage walkover surveys have been undertaken;
- ecology and biodiversity: additional Phase 1 habitat surveys have been undertaken and new baseline data has become available; and
- traffic and transport: additional information has been obtained on traffic flows for certain roads/junctions and some additional non-motorised user surveys have been undertaken.

#### **Air quality: future baseline**

2.2.2 Since the assessment of the original scheme, Defra has updated the tools for undertaking air quality assessments, including background pollutant concentrations and road vehicle emission factors. These are used to create the inputs for dispersion modelling of road traffic emissions.

2.2.3 The changes for these revised tools include updated emission factors for different types of vehicles and assumptions on fleet composition and future projections. Key changes relevant to this assessment are an increase in predicted NOx emissions for diesel cars and light goods vehicles and a reduction for Euro VI heavy goods vehicles. These updated tools have been used for the air quality assessment for the SES2 and AP2 ES.

2.2.4 Using these updated tools in undertaking the air quality assessment results in an increase in the predicted road traffic emissions for NOx (especially along motorways) and a larger number of receptors being reported as experiencing a significant effect without the HS2 scheme. This is because higher concentrations are being predicted

for the future baseline scenario resulting in more locations being in excess of the annual mean NO<sub>2</sub> air quality standard of 40µg/m<sup>3</sup>. At such locations where NO<sub>2</sub> concentrations are predicted to exceed the air quality standard without the scheme, it is more likely that a small increase in concentrations due to the scheme will result in a significant effect.

## **2.3 Changes to the design and construction assumptions within the existing powers of the Bill**

2.3.1 Some of the changes to the design and construction assumptions can be made within the existing powers of the Bill and, therefore, no amendments to the powers conferred by the Bill are required for these changes. These are reported within the SES<sub>2</sub>, where they result in new or different likely significant environmental effects from those reported in the main ES, as amended by the SES<sub>1</sub>. The main SES<sub>2</sub> changes are summarised in Section 2.4 and, where relevant, further detail is provided in Part 1 of the Volume 2 community area reports.

## **2.4 Summary of the main SES<sub>2</sub> changes**

2.4.1 This section provides an overview of the main SES<sub>2</sub> design and construction assumption changes. All of the changes are described in Part 1 of each Volume 2 community area report and, where relevant, are shown in the Volume 2 map books.

### **Changes to earthworks and movement of materials**

2.4.2 Since submission of the Bill, a route-wide review of earthworks and movement of materials for Phase 2a has been carried out, taking into account design development and changes in construction assumptions, as part of the preparation of the SES<sub>2</sub> and AP<sub>2</sub> ES.

2.4.3 The review has sought to reduce the use of off-site disposal of excavated materials, whilst balancing engineering, construction, environmental and cost considerations. It has taken account of considerable variation in geological and geotechnical conditions along the route (including information from stakeholders) and the differing technical requirements of the design. It also included a review of the quantities of useable aggregates that can be extracted from the borrow pits and the quantities of excavated material that can be used to fill the borrow pits.

2.4.4 Changes that have increased the surplus of excavated materials include:

- changes to engineering design e.g. lowering the portal and extending the southern portal of the tunnel at Whitmore Heath;
- increased use of granular treatment for a number of cuttings and low height embankments, which involves the additional excavation of less suitable materials and its replacement with equal volumes of higher quality fill materials; and

- refinements and corrections to the analysis of materials quantities that had been used for the main ES<sup>1</sup>.

2.4.5 Changes that have decreased the surplus of excavated materials include:

- new or enlarged landscape earthworks to improve mitigation e.g. at the Stone IMB-R; and
- use of materials for environmental mitigation, such as noise bunds.

2.4.6 Overall, these changes result in an increase in the estimated surplus of excavated materials in the AP2 assessment. In order to reduce this surplus and the need to transport materials away from the HS2 route, the local placement of excavated materials is proposed and a number of suitable sites have been identified on land already required for the construction of the scheme.

2.4.7 Taking account of the use of local placement areas in the design, the estimated overall net surplus of excavated materials to be transported away from the HS2 route for off-site disposal to landfill will be approximately 1,614,779 tonnes, which may be compared to an overall net surplus of excavated materials of 680,485 tonnes for the original scheme reported in the main ES.

2.4.8 The AP2 revised scheme will, in total, generate approximately 45,412,956 tonnes of excavated materials during the construction period between 2020 and 2026. It is estimated that 92% of the excavated materials generated by the AP2 revised scheme will be used as fill on a route-wide basis, with a further 4% of the excavated materials generated directed to local placement areas along the line of the route. Together, these measures provide for an estimated 96% of excavated materials to be managed on-route. The estimated quantity of surplus excavated materials that will require off-site disposal to landfill is less than 4% of the overall excavated materials that will be generated on a route-wide basis, based on the current level of design. Further detail is provided in Volume 3, Route-wide effects: chapter 12 Waste and material resources.

2.4.9 The resulting earthworks and materials movement quantities have been used as the basis for the update of the transport assessment and the assessment of transport-related environmental effects. These assessments are reported in Section 7 in Part 2 of each Volume 2 community area report.

### **Local placement of surplus excavated materials**

2.4.10 As part of the earthworks and materials movement review, the scope for local placement of surplus excavated materials on land already required for the construction of the scheme was considered.

2.4.11 Local placement will reduce the need for off-site road transport and disposal of surplus excavated materials and reduce the associated environmental impacts arising from HGV movements on the highway network. An analysis has been undertaken which examines, in the absence of local placement areas, the potential extent of the need to transport additional surplus materials from the scheme by road. Surplus materials would be transported via site haul roads to transfer nodes and transferred to road-

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<sup>1</sup> Further detail is provided in Volume 3, Route-wide effects: chapter 12 Waste and material resources and Volume 5: Route-wide waste and material resources assessment (WM-001-000).



going vehicles prior to disposal off-site. It has been estimated that this would be likely to require an additional 127,000 HGV trips and add over 4 million HGV vehicle kilometres on the road network during the construction period. The Volume 5: Appendix TR-001-000 provides details of this analysis and further information on the two transfer nodes and associated parts of the road network that would be likely to be affected by those additional HGV movements.

- 2.4.12 Local placement areas will be used to accommodate inert material excavated locally that is surplus or unsuitable for use as engineering fill. This will be placed on land that has already been used for HS2 construction works or storage areas and from which the topsoil and subsoil has been removed and stored to protect it during construction. Local placement will take the form of landscaped ground raising (by up to 3m) with shallow slopes (at a gradient of 1 in 8 or less) making the restored sites suitable to be returned to agricultural use. The restoration principles, including the replacement of topsoil and subsoil, will be the same as for the borrow pits<sup>2</sup> so that agricultural land can be returned to a condition suitable for its previous use. Land drainage will be provided, where necessary. Local placement will take place within the period of the use of these sites during the overall construction programme and is not expected to delay the restoration of these sites to their former use. Restoration will take place in accordance with the requirements of the schedules to the Bill and will involve approval by local planning authorities and consultation with other stakeholders, including landowners.
- 2.4.13 Twenty sites suitable as local placement areas have been identified across the Phase 2a route, by applying appropriate environmental, engineering and construction criteria. They vary between 0.7ha and 8.5ha in area and each is generally capable of accommodating between approximately 10,000 and 100,000 m<sup>3</sup> of surplus excavated materials. One site, in the Whitmore Heath to Madeley area, has capacity for up to 200,000m<sup>3</sup>. The overall capacity of the local placement areas identified is approximately 1 million m<sup>3</sup> (approximately 1,992,020 tonnes)<sup>3</sup>.
- 2.4.14 A process of identifying potentially suitable local placement areas in each relevant community area was undertaken. This process identified potential locations for the placement of surplus excavated material, and these were considered against the following criteria, which set out the key considerations for the suitability of local placement sites:
- seeking sites close to where local surplus excavated materials will be generated, which would otherwise have to be transported off-site;
  - only selecting sites from the land already required for the construction of the scheme;
  - avoiding land identified for early habitat creation areas or other ecological mitigation or for landscape planting;
  - avoiding land above source protection zones (SPZs) or major utility diversions;

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<sup>2</sup> Phase2a environmental statement technical appendices: Borrow pits restoration strategy (CT-009-000)

<sup>3</sup> Tonnage quoted from Volume 3 Waste and material resources.

- avoiding land that will be required for railway systems compounds or for material transfer nodes, which will remain in use late in the construction programme; and
- avoiding land where placement could create local adverse visual or other potentially significant environmental effects.

2.4.15 The individual local placement areas are described in Part 1 of the Volume 2 community area reports.

2.4.16 The need for local placement areas will be subject to review as the design develops, as explained below in relation to opportunities for further refinement of earthworks and movement of materials.

### Changes to borrow pit depths and areas

2.4.17 The Bill provides for the acquisition of land for four borrow pits in the Fradley to Colton area, one borrow pit in the Whitmore Heath to Madeley area and one borrow pit in the South Cheshire area to provide material to construct elements of the HS2 scheme, in particular to construct railway embankments<sup>4</sup>. Volume 1 of the main ES describes in detail the use of borrow pits and Volume 5: Appendix CT-009-000 of the main ES sets out the Borrow pits restoration strategy.

2.4.18 The assessment of effects associated with the borrow pits, as reported in the main ES, was based on an assumed average depth of mineral extraction, including an average topsoil and subsoil depth. Based on available geological information, the assessment of the borrow pits also considered the effects of excavating to a greater maximum depth, which could allow refinement of the proposed working arrangements for the borrow pits (e.g. reducing the footprint required for mineral extraction) and reduce sterilisation of potential mineral resources.

2.4.19 Since submission of the Bill, additional historical information has become available relating to the likely ground conditions in the vicinity of the borrow pits in the Fradley to Colton area and also in the vicinity of the borrow pit in the Whitmore Heath to Madeley area. For three of the borrow pits in the Fradley to Colton area, this indicated that useful mineral may be present to a maximum depth greater than originally estimated. The new information for the fourth borrow pit in the Fradley to Colton area (at Blithbury, located to the north of the River Trent viaduct) confirmed the previous estimated maximum depth. The new information for the borrow pit in the Whitmore Heath to Madeley area indicated that useful mineral may be present to an assumed average depth greater than originally estimated, but confirmed the previous assessment of the estimated maximum depth of the mineral. In addition, hydrogeological models have been developed for each borrow pit in the Fradley to Colton area.

2.4.20 There has, in addition, been a change to the assumption about the depth of topsoil and subsoil at all of the borrow pits. This depth was assumed for all borrow pits in the main ES to be an average of 0.8m. It is now assumed that topsoil and subsoil will be

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<sup>4</sup> The materials extracted from the borrow pits are intended for constructing the railway embankments. However, if the properties are suitable, and sufficient quantities are available, there may be an opportunity for minerals extracted from the borrow pits to be used to make concrete or other cement bound materials for construction of the scheme.

## SES2 and AP2 ES - Volume 1: Introduction and methodology

excavated and restored to an average depth of 1.2m to allow a full agricultural soil profile to be restored.

- 2.4.21 Table 1 provides a summary of the changes to the assumed maximum extraction depth below existing ground level of the mineral at three of the four borrow pits in the Fradley to Colton area. The information from the main ES is provided for context.

Table 1: Summary of changes to estimated assumed maximum depth of mineral extraction at borrow pits in the Fradley to Colton area

Borrow Pit location	Assumed average depth of mineral extraction (m) reported in the main ES	Estimated maximum depth of mineral extraction (m) reported in the main ES	SES2 assumed average depth of mineral extraction (m)	SES2 estimated maximum depth of mineral extraction (m) (based on additional historical information) <sup>5</sup>
Kings Bromley South, located either side of Crawley Lane and to the south of Ashby Sitch, both sides of the HS2 route	4.1m	12.8m	4.1m (no change)	18.0m
Kings Bromley North, located adjacent to the realigned A515 Lichfield Road	4.1m	8.8m	4.1m (no change)	18.0m
Kings Bromley North, located adjacent to the realigned Shaw Lane	4.3m	8.8m	4.3m (no Change)	18.0m

- 2.4.22 Table 2 provides a summary of the change to the assumed average extraction depth below existing ground level of the mineral at the borrow pit in the Whitmore Heath to Madeley area. The information from the main ES is provided for context.

Table 2: Summary of changes to estimated assumed average depth of mineral extraction at the borrow pit in the Whitmore Heath to Madeley area

Borrow Pit location	Assumed average depth of mineral extraction (m) reported in the main ES	Estimated maximum depth of mineral extraction (m) reported in the main ES	SES2 assumed average depth of mineral extraction (m)	SES2 estimated maximum depth of mineral extraction (m) (based on additional historical information) <sup>6</sup>
West of Netherset Hey Farm	4.3m	17.8m	8.0m	17.8m (no change)

<sup>5</sup> The maximum extraction depth assumes that topsoil and subsoil will be excavated and restored to an average depth of 1.2m to allow a full agricultural soil profile to be restored.

<sup>6</sup> The maximum extraction depth assumes that topsoil and subsoil will be excavated and restored to an average depth of 1.2m to allow a full agricultural soil profile to be restored.

- 2.4.23 Since production of the SES<sub>1</sub> and AP<sub>1</sub> ES, HS<sub>2</sub> Ltd has been undertaking preliminary ground investigations at all of the borrow pits and at six major cuttings to ascertain the depth, extent and suitability of the mineral resources available to construct the HS<sub>2</sub> scheme and to allow further refinement to the proposals for use of the borrow pits.
- 2.4.24 Initial results from the preliminary ground investigations suggest that, in practice, the depths of mineral resources at the three borrow pits within the Fradley to Colton area and at the borrow pit in the Whitmore Heath to Madeley area are variable, but likely to be less than the 18.0m and 17.8m maximum depths shown in Tables 1 and 2. However, as the ground investigation is at an early stage and further work is required to validate the findings, the assessment has as a precaution considered the 18.0m and 17.8m maximum depths at these four borrow pits.
- 2.4.25 Further design development has also identified the need to amend the designs of a number of borrow pits. These changes require additional land to provide for pipes from the borrow pits to allow the recharge of groundwater; diversion of watercourses; and/or the reduction in the area of borrow pits to allow for utility works.
- 2.4.26 Details of the amendments to borrow pit design and any significant environmental effects are reported in Part 2 of the Fradley to Colton, Whitmore Heath to Madeley and South Cheshire Volume 2 community area reports.

### **Opportunities for further refinement of earthworks and materials movement**

- 2.4.27 The earthworks and materials movement quantities used as the basis for the assessment is considered a reasonable worst case for the environmental assessment reported in the SES<sub>2</sub> and AP<sub>2</sub> ES.
- 2.4.28 HS<sub>2</sub> Ltd will continue to investigate opportunities for reducing the environmental effects arising from earthworks and materials movement, including:
- changing the design of engineering earthworks e.g. steepening cutting slopes and reducing excavation volumes, where further ground investigation shows this to be feasible;
  - the use of in-situ ground stabilisation, reducing the need to replace material that does not meet engineering requirements;
  - the inclusion of additional or larger landscape earthworks, where these would improve mitigation screening of the railway from nearby communities; and
  - seeking opportunities to use surplus excavated material on land outside Bill limits. This could involve providing material, for example, for land restoration or flood defence schemes or the placement on land which HS<sub>2</sub> Ltd has acquired, for example, severed land, or on other land with the agreement of the owners.

- 2.4.29 These opportunities will be explored during detailed design, taking account of the balance of engineering, environmental and construction requirements and cost, in accordance with the HS2 Phase 2a Environmental Minimum Requirements (EMR)<sup>7</sup>.

### Changes to the construction programme

- 2.4.30 Since submission of the SES1 and AP1 ES, changes to the design and construction assumptions (including changes to the earthworks and movement of materials) have resulted in the need to make changes to the indicative construction programme.
- 2.4.31 Details of changes to the construction programme are described in Part 1 of each Volume 2 community area report, where these relate to SES2 changes, and in Part 2 of each Volume 2 community area report, in the description of individual AP2 amendments, where relevant.

### Changes to railway systems compounds

- 2.4.32 Since the submission of the SES1 and AP1 ES, refinement of the construction methodology including the access requirements for the installation of slab track<sup>8</sup> has led to changes to the operation of a number of railway systems compounds. These include:
- change to the operational period (duration and start/end date);
  - change in the number of railway system workers (peak and/or average); and
  - change in railway systems construction traffic numbers (heavy goods vehicles (HGV) and cars/light goods vehicles (LGV)).
- 2.4.33 In addition, there is a need for three new railway systems compounds specifically for the installation of slab track. These will be located within land included in the Bill for the provision of civil engineering compounds. The provision of these compounds increases the number of worksites from which the installation of slab track can be managed and will make the construction process more efficient, by allowing installation machinery to start from one compound, travel along the route installing slab track, and to leave at the next compound.
- 2.4.34 Any new or different significant effects arising from the changes to railway systems compounds, are reported and compared with those in the main ES, as updated by SES1.
- 2.4.35 Further information on the changes to the design and construction assumptions related to the installation of slab track is provided in Part 1 of each Volume 2 community area report.
- 2.4.36 HGV movements arising as a result of the changes to the operation of the existing railway systems compounds and the provision of new compounds in combination with the SES2 design changes and AP amendments are considered in Part 2 Section 7 of each Volume 2 community area report.

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<sup>7</sup> High Speed Rail (West Midlands - Crewe) Environmental Statement Volume 1: Introduction and methodology, chapter 9

<sup>8</sup> High Speed Rail (West Midlands - Crewe) Supplementary Environmental Statement and Additional Provision Environmental Statement Volume 1: Introduction and methodology, chapter 7

## **Additional utility works and associated construction compounds**

- 2.4.37 Since submission of the SES1 and AP1 ES, a need for further changes to utilities that are affected by the scheme, which has included the provision of construction compounds for some of those works, has been identified. Changes to the power supplies for HS2 are described separately in Section 3.
- 2.4.38 The need to make these changes has arisen from design refinement work and further consideration of the views of stakeholders, including the relevant utility companies.
- 2.4.39 The proposed changes include both permanent and temporary diversions of water mains, sewers, gas mains, telecommunications cables and poles, and power cables. In some instances temporary provision of utilities, for example to a construction compound, is required. Where changes require additional land or a change to powers included in the Bill for their construction these are reported in Part 2 of each Volume 2 community area report.
- 2.4.40 For certain utility works already included in the main ES and the SES1 and AP1 ES, the construction requirements have been refined to identify specific construction compounds within the land already identified for those works. The additional compounds will support the utility works and provide site offices and welfare facilities, vehicle parking, plant and materials storage.
- 2.4.41 Further information on the changes to utilities and the new utility construction compounds, and their timing in the construction programme, is provided in each Volume 2 community area report.

## **2.5 Summary of other SES2 changes**

- 2.5.1 Other changes that can be made within the existing powers of the Bill and are reported in the SES2, include the following changes to the design and construction assumptions:
- lowering of Kings Bromley viaduct, Bourne embankment and River Trent viaduct in the Fradley to Colton community area;
  - relocation of a balancing pond in the Fradley to Colton community area;
  - extension of a noise fence barrier in the Colwich to Yarlet community area;
  - landscape earthworks in the vicinity of the Stone Infrastructure Maintenance Base-Rail (IMB-R) in the Stone and Swynnerton community area;
  - increase in length and changes to the design of the M6 Meaford Viaduct in the Stone and Swynnerton community area, to carry the HS2 route across the M6 and avoid the realignment of the southbound lanes of the M6;
  - reconfiguration of the existing West Coast Main Line (WCML) tracks between the A500 Shavington Bypass and Madeley Bridleway 2 in the Whitmore Heath to Madeley community area and the South Cheshire community area;
  - new permanent farm access routes in the South Cheshire community area;

- new construction traffic routes; and
- changes to environmental mitigation.

## **2.6 Corrections to the main ES**

- 2.6.1 Since submission of the Bill, the need for a number of further corrections to the contents of the main ES and SES 1 has been identified. These are set out in Section 2 of each community area report of the SES2, where the corrections relate to a Volume 2 community area report; in Volume 3 where the corrections relate to route-wide matters reported in Volume 3; and in Volume 5: Appendix CT-006-000 where the corrections relate to Volume 5.
- 2.6.2 Corrections have been made where it was identified that they had the potential to create a new or different significant effect from that reported in the main ES or SES1, or where a factual inaccuracy relating to a significant effect was identified. The community area reports also clarify elements of the scheme description reported in the main ES or SES1. The information provided identifies the location of the text that is subject to the correction, the reason for the correction, the text from the main ES or SES1, and identifies whether the correction changes a significant effect. Where relevant, these corrections have been taken into account in the technical assessments contained within the SES2 and AP2 ES.

## 3 Introduction to the AP<sub>2</sub> ES

### 3.1 Introduction

- 3.1.1 Since the publication of the SES<sub>1</sub> and AP<sub>1</sub> ES, the need for a number of amendments has been identified as a result of the Select Committee process, ongoing discussions with stakeholders and as a result of design refinements. These amendments include requirements for the acquisition or use of land outside the existing powers of the Bill, additional access rights, or other extensions of the powers conferred by the Bill. The AP<sub>2</sub> seeks powers to make these amendments.
- 3.1.2 The AP<sub>2</sub> ES reports the likely significant environmental effects of the amendments sought in the AP<sub>2</sub>. It bases its comparison upon effects reported in the main ES, as amended by the SES<sub>1</sub> and the SES<sub>2</sub>, taking into account the AP<sub>1</sub> ES, as appropriate. The AP<sub>2</sub> ES also reports the likely significant effects of proposed changes to the HS<sub>2</sub> Phase One scheme<sup>9</sup> at Handsacre Junction.

### 3.2 Summary of the main AP<sub>2</sub> changes

- 3.2.1 This section provides a summary of the main amendments included within AP<sub>2</sub>. All of the amendments are described in Part 2 of each Volume 2 community area report and are shown in the Volume 2 map books.

#### Traction power supply

- 3.2.2 Volume 1 of the main ES, in section 5.14, describes the power supply requirements for the operation of the Phase 2a route and how these will be met. In particular, it describes how the traction power supply<sup>10</sup> for trains running on Phase 2a will be from the Newlands Lane auto-transformer feeder station (ATFS) on the northern side of the railway. The ATFS was to be connected via a 132kV three circuit power supply to the National Grid at a substation on the site of the decommissioned Rugeley Power Station.
- 3.2.3 Since submission of the Bill, the development of the traction power design has identified that in order to enable National Grid to meet HS<sub>2</sub>'s power supply requirements for Phase 2a whilst maintaining resilience in National Grid's overall supply to the local area, additional physical power supply infrastructure would have been needed from the south to the substation on the site of the decommissioned Rugeley Power Station. It is now understood that meeting both HS<sub>2</sub> and National Grid requirements would not be achievable under the original scheme.
- 3.2.4 Further studies have accordingly been undertaken to identify and appraise an appropriate solution to this problem. The principal purpose of these studies was to select a suitable National Grid supply point (GSP) which would provide National Grid and HS<sub>2</sub> Ltd with resilience of supply.
- 3.2.5 The selected option will provide a new grid connection between Parkgate, on the B5234, 1.5km west of Newborough, and the Newlands Lane ATFS. The connection to Rugeley Power Station, provided in the original scheme, will be removed from the AP<sub>2</sub> revised scheme. The Newlands Lane ATFS will remain at the same location and as

<sup>9</sup> As set out in the High Speed Rail (London - West Midlands) Act 2017 and in the relevant volumes of the HS<sub>2</sub> Phase One ES.

<sup>10</sup> Electricity supplied for train operation.



described in the main ES. A suitable GSP to connect to the 400kV network has been identified at Parkgate and a suitable route corridor identified to connect a new Parkgate substation to a new substation alongside the Newlands Lane ATFS. The design provides for a 132kV overhead line to consist of two parallel lines of steel pylons, one carrying a double circuit and the other carrying a single circuit, for 7.7km. Figure 3 illustrates a similar pylon arrangement.

Figure 3: An indicative example of two parallel lines of pylons



- 3.2.6 An additional 233.4ha of land beyond the land required in the original scheme has been identified to allow for the construction of the Parkgate grid supply point connection. Although the construction corridor has been selected to avoid residential properties and key environmental constraints, it does run through areas not previously affected by the railway and its associated infrastructure. In addition to the land required for construction, land for environmental mitigation of the connection, together with land and rights for maintenance access, for National Grid, will be required.
- 3.2.7 The width of the pylon construction corridor allows for pylon locations to be adjusted during detailed design, as well as safe and efficient pylon erection, overhead line stringing and associated works and access for future maintenance. As the design is further refined, the corridor can be reduced in width and not all of the land identified will be required for construction. After construction, most of the land required can be returned to its existing condition and use.
- 3.2.8 During detailed design, localised constraints, such as ground conditions, may require the pylons to be repositioned. A sensitivity assessment for each topic has considered the following potential variations, including any combination of these: repositioning the pylons by up to 50m in either direction along the power line route; and/or laterally within the pylon construction corridor; and/or for the pylons to be up to 3m higher. Where this may result in new or different significant environmental effects these are reported within the relevant topic assessments.

3.2.9 Overhead line construction will be undertaken in accordance with National Grid's standard approach to construction of high voltage overhead lines, which follows the sequence set out below:

- **Building a pylon.** A pylon working area, which will include a crane pad and temporary access, will be provided. Topsoil will be stripped from the site and stored for restoration of the site. Foundations will be built for each pylon. Excavators will be used to dig holes for the foundations, and in certain ground conditions specialist piling rigs will be required. Pre-mixed concrete will then be delivered by HGVs to site, along with steelwork for the foundation frames and bases. The pylon will be assembled in sections and will be put up using a mobile crane which lifts the assembled steelwork into position.
- **Wiring/stringing.** The wires (conductors) which carry the electricity will usually be installed in sections of about 10 or more pylons at a time. First, pilot wires will be run at ground level (and over temporary scaffolding protecting obstacles, roads etc.) along the full length of the section, between the 'pulling site' and the 'tensioning site' where the new conductor is positioned. The pilot wires will then be lifted and fed through all the towers in the middle of the section, and around a special machine at the pulling site. In order to keep the wires off the ground, the tensioning site will have a similar machine that stops the wire running freely when the pulling machine 'pulls' the pilot wire. When the new wire is fully 'run out', it will be installed at its finished tension and height above ground.
- **Reinstatement.** Once the overhead line is constructed, reinstatement of all of the land that has been used, except for that occupied by permanent structures, maintenance accesses and environmental mitigation, will take place. The environmental mitigation measures to be provided are described in the Volume 2 Fradley to Colton community area report.

3.2.10 Further details and the assessment of the Parkgate grid supply point connection are reported in Part 2 of the SES2 and AP2 ES, Volume 2 Fradley to Colton community area report.

### **Construction and operation power supplies: Whitmore and Madeley tunnels**

3.2.11 Power connections will be required to operate the tunnel boring machines (TBM) for the construction of the Whitmore Heath and Madeley tunnels. The power connections will be retained permanently to be used for the operation of the tunnel, including lighting and ventilation systems.

3.2.12 It was originally proposed that these power supplies would be provided by the statutory electricity undertaker, but in order to provide certainty that the scheme can be implemented within the construction programme, it is necessary to include powers within the Bill.

### *Power supply for Whitmore Heath tunnel*

- 3.2.13 The power supply for Whitmore Heath tunnel will originate at an existing Western Power Distribution sub-station, referred to as Meaford Bulk Supply Point (BSP<sup>11</sup>), located between Meaford Road and the Trent and Mersey canal to the east of the HS2 route. From the Meaford BSP, the 33kV power supply will follow an underground route that finishes at the southern porous portal of Whitmore Heath tunnel. The total length of the underground route is approximately 14.5 km. For the majority of its length, the supply route is within the footprint of existing highways and will be installed either beneath the verge or the carriageway.
- 3.2.14 These works require 14.9 ha of additional land during installation. Further details and assessment of these works are reported in Part 2 of the SES2 and AP2 ES, Volume 2 Whitmore Heath to Madeley community area report.

### *Power supply for Madeley tunnel*

- 3.2.15 The power supply will originate at an existing Western Power Distribution sub-station, referred to as Newcastle Bulk Supply Point, located on Brymbo Road to the north of Newcastle-under-Lyme, approximately 10 km to the east of the HS2 route and the east of the M6. From the entrance to the Newcastle Bulk Supply Point (BSP) on Brymbo Road, the 33kV power supply will follow an underground route that finishes at the southern porous portal of Madeley tunnel. The total length of the route is approximately 11.5 km. For the majority of its length, the supply route is within the footprint of existing highways and will be installed either beneath the verge or the carriageway.
- 3.2.16 These works require 15 ha of additional land during installation. Further details and assessment of these works are set out in Part 2 of the SES2 and AP2 ES, Volume 2 Whitmore Heath to Madeley community area report.

### **Whitmore Heath Tunnel southern extension and vertical track alignment**

- 3.2.17 Since submission of the Bill, HS2 Ltd has proposed an extension of the southern portal of Whitmore Heath tunnel. This has resulted in changes to the vertical alignment of the HS2 route between the Hatton South cutting and River Lea viaduct to enable the southern porous portal of the Whitmore Heath tunnel to be relocated to the south-east of the A53 Newcastle Road. This will avoid the requirement to temporarily realign the A53 Newcastle Road and will change the construction method of the Whitmore Heath tunnel, from cut and cover and twin bore, to twin bore only.
- 3.2.18 The amendment to construct the longer twin-bore section and relocate the southern porous portal of Whitmore Heath tunnel will result in the requirement for approximately 15ha of additional land outside the limits of the Bill. It is assumed that all of the additional land will be returned to its existing use following construction.
- 3.2.19 Further details and assessment of these amendments are reported in Part 2 of the SES2 and AP2 ES, Volume 2 Whitmore Heath to Madeley community area report.

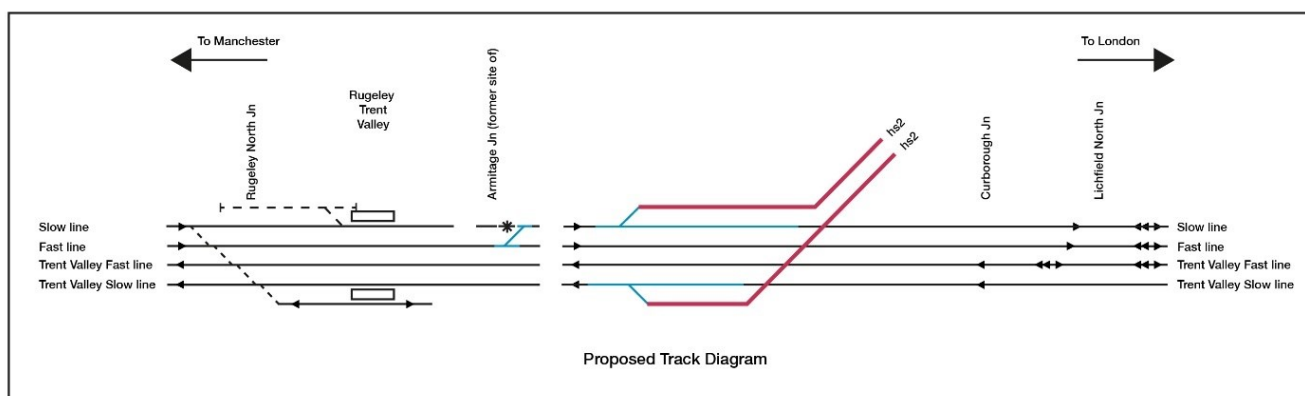
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<sup>11</sup> A point where the electricity supply for HS2 will be connected into the National Grid or other supply network

## Changes to Phase One at Handsacre

- 3.2.20 The High Speed Rail (London to West Midlands) Act 2017 provides for a connection to the West Coast Main Line (WCML) south of Handsacre, within the Whittington to Handsacre community forum area (CFA22). HS2 trains would connect to the WCML via the Handsacre Spur, providing a connection via Stafford capable of providing up to seven trains per hour (one-way train flow). Following completion of HS2 Phase 2a in 2027, the number of trains has been assumed to reduce to one train per hour (one-way train flow). Six of the trains going north of Birmingham would use the Phase 2a infrastructure, with one train joining onto the conventional network at the Handsacre Junction connection to the WCML.
- 3.2.21 Further consideration has been given to identify opportunities to reduce the disruption to the WCML during construction and reduce cost. Design development identified that a slow line connection was feasible and offers advantages in terms of reduced disruptive possessions on the WCML and reduced construction costs.
- 3.2.22 A revised rail connection into the WCML 'slow' lines will be provided, with the HS2 lines connecting to the outside lines of the WCML corridor, therefore removing the need to realign the easternmost tracks of the WCML. This is shown diagrammatically in Figure 4.

Figure 4: Revised HS2 connection to the WCML at Handsacre



- 3.2.23 As additional land and powers are required for the revised rail connection, the works are being brought forward as part of the AP2 amendments to Phase 2a of HS2.
- 3.2.24 The powers in the Phase One Act will be used to undertake early elements of the works, including site clearance, habitat creation, establishment of the construction compound, utility works and access tracks. The main construction works will be undertaken using Phase 2a Bill powers.
- 3.2.25 Altering the junction in this way and not proceeding with the WCML works will deliver substantial benefits and are likely to avoid or reduce some adverse environmental effects of the original Phase One scheme. The details of the revised Handsacre works and the environmental assessment are reported in Part 2 of the SES2 and AP2 ES Volume 2 Fradley to Colton community area report.

## 3.3 Summary of other AP2 amendments

- 3.3.1 The need for other amendments has also been identified since submission of the Bill. These include additional land for:

- a replacement facility for Mayfield Children's Home in the Colwich to Yarlet area, to reduce the significant adverse environmental effects that would arise during the operation of HS2 on the existing Mayfield Children's Home, identified in the main ES. It will be relocated to the site of the former Westwood School, adjacent to Rugeley School, on the outskirts of Blithbury in Lichfield, in the Fradley to Colton area. The amendment will require an additional 2.3ha of land;
- the reconfiguration of Ingestre Golf Club in the Colwich to Yarlet area to replace the land lost and severed by the HS2 route. This will require 61ha of additional land. Ingestre Park Golf Clubhouse and the part of the course to the north of the HS2 route will be retained within the reconfigured golf course layout;
- permanent replacement car parking (800 spaces) to the east of Staffordshire County Showground in the Colwich to Yarlet area to replace the car parking lost as a result of construction of the Hopton South Cutting and realignment of the A518 Weston Road;
- modifications to the Yarnfield Lane M6 overbridge replacement in Stone and Swynnerton area, allowing construction earlier in the programme and without requiring substantial traffic management on the M6 motorway. The works will also result in safety improvements and reduced disruption to users of Yarnfield Lane;
- rail systems modifications and civil engineering works in and around Crewe Station in the South Cheshire area;
- highway modifications and associated mitigation, including habitat creation;
- amendments to public rights of way;
- compounds, laydown, diversion and other works to utilities such as gas mains, water mains, overhead electricity lines and telecommunications cables and compounds for such works;
- relocation of balancing ponds; and
- revisions to site haul routes and maintenance access routes.

## 4 Scope and methodology of the SES2 and the AP2 ES

### 4.1 Scope and methodology for the main ES, SES1 and AP1 ES

4.1.1 The HS2 Phase 2a Scope and Methodology Report (SMR) (see the main ES, Volume 5: Appendix CT-001-001) was first published for consultation in March 2016 and the final version published in September 2016. It sets out the scope and methodology for the environmental impact assessment (EIA) of the scheme.

4.1.2 An SMR Addendum (see the main ES, Volume 5: Appendix CT-001-002) was published in July 2017 and set out where the methodology presented within the SMR had been amended or advanced as a result of:

- changes to legislation or industry best practice guidance;
- the methodology undergoing refinement as a result of its application within the EIA; and
- further feedback on the outlined methodology received from stakeholders including statutory bodies following the ongoing application of that methodology.

4.1.3 The methodologies set out in the SMR and SMR Addendum were used for the main ES and for the SES1 and AP1 ES.

### 4.2 Scope and methodology for the SES2 and AP2 ES

#### Scope and methodology reports

4.2.1 Assessment of the impacts and effects of the SES2 changes and AP2 amendments was undertaken in accordance with the methodology outlined for each environmental topic in the SMR and SMR Addendum. The assessment also takes account of an SMR Addendum 2<sup>12</sup>, which has been amended for cultural heritage, ecology and biodiversity, landscape and visual assessment, and water resources and flood risk assessment. In summary, the relevant changes are as follows.

- **Cultural heritage:** Historic England has produced updated advice on the consideration of the setting of heritage assets.
- **Ecology and biodiversity:** The list of relevant national and international legislation has been updated to include the Conservation of Habitats and Species Regulations 2017 and the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
- **Landscape and visual assessment:** An additional section has been included to set out the methodology relevant to the assessment of the grid supply point connection to the National Grid Parkgate substation.
- **Water resources and flood risk.** This section has been updated to reflect new baseline information and data and the publication of new government

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<sup>12</sup> Refer to Volume 5: Scope and methodology report addendum 2 (Appendix CT-001-000).



groundwater protection guides. Further information is provided on the approach to assessing compliance with Water Framework Directive legislation. Examples of the value of waterbodies or receptors have been clarified further.

## Sound, noise and vibration guidance

- 4.2.2 In October 2018, the World Health Organisation (WHO) published an update to its Community Noise Guidelines 1999<sup>33</sup>, which are now called the Environmental Noise Guidelines<sup>34</sup> (ENG18). The update partially supersedes the 1999 guidelines and complements the WHO 2009 Night Noise Guidelines (NNG09)<sup>35</sup>. The WHO's earlier 1999 and 2009 guidelines form part of the basis for the HS2 programme's environmental, health and equality impact assessment criteria (as set out in the Scope and Methodology Reports and also Information Paper E20 for HS2 Phase One and Information Paper E9<sup>36</sup> for Phase 2a).
- 4.2.3 Government noise policy and hence HS2 Ltd aim to minimise adverse effects on health and quality of life due to noise and avoid significant effects, in the context of Government policy on sustainable development. As part of meeting these aims, and in response to Government noise policy, HS2 Ltd has set Lowest Observed Adverse Effect Levels (LOAEL) and Significant Observed Adverse Effect Levels (SOAEL) for both day and night time periods. At night, both LOAEL and SOAEL are set in terms of equivalent continuous noise levels over the night-time 8-hour period (2300 to 0700) and also the maximum noise levels ( $L_{pAFmax}$ ) from the scheme.
- 4.2.4 ENG18 guideline noise values 'define an exposure level at which effects certainly begin.' Whilst this guideline definition is similar to the definition of a LOAEL, ENG18 states that 'The guideline exposure levels presented are therefore not meant to identify effect thresholds (the lowest observed adverse effect levels for different health outcomes). This is a difference in approach from prior WHO guidelines'. Nonetheless the ENG18 guideline definition makes clear that the guidelines are closer to LOAEL rather than SOAEL values in terms of UK Government noise policy and, hence, in terms of HS2 assessment criteria.
- 4.2.5 A review of ENG18 has concluded the following with regard to the HS2 Phase 2a assessment criteria for operational rail and altered roads (as defined in the SMR and Information paper Eg):
- HS2 SOAEL values: The justification for all HS2 SOAEL values ( $L_{pAeq}$  and  $L_{pAFmax}$ ) remains unchanged;
  - HS2 LOAEL values: The LOAEL  $L_{pAeq}$  values for day and night are precautionary. For example, ENG18 notes that the  $L_{pAeq}$ , 8hr exposure values defined in NNG09 as the LOAEL for the scheme is set with the aim of protecting the whole population, including, to some extent, vulnerable groups, whereas the ENG18 night time guideline value might not lead to full protection of the population, including all vulnerable groups. The need for an

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<sup>33</sup> World Health Organisation, Guidelines for community noise, 1999

<sup>34</sup> World Health Organisation, Environmental Noise Guidelines for the European region, 2018

<sup>35</sup> World Health Organisation, Night noise guidelines for Europe, 2009

<sup>36</sup> HS2 Phase One Information Papers: environment (Series E) Control of Airborne noise (E20) and HS2 Phase 2a Information Papers: Control of Airborne Noise (Eg)

outdoor maximum LOAEL for night-time continues to be justified by NNG09. ENG18 makes no recommendations for single-event noise indicators but advises that they are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by  $L_{Amax}$ .

- 4.2.6 ENG18 was published very shortly before the assessment in the SES2 and AP2 ES was completed but it does not lead to a requirement for any changes to the Phase 2a methodology with regard to sound, noise and vibration.

### Scoping

- 4.2.7 Prior to the assessment, a scoping exercise was used to determine whether the SES2 changes and the AP2 amendments had the potential to result in any likely new or different significant environmental effects, separately and cumulatively, compared with those reported in the main ES, as amended by the SES1, taking into account any relevant AP1 amendments.
- 4.2.8 Any SES2 changes and AP2 amendments identified as having such potential were then subject to further assessment, following the methodology outlined for each relevant environmental topic in the SMR and SMR Addenda and any new or different significant effects arising from the changes and amendments are reported in the SES2 and AP2 ES Volume 2 community area reports.

### Route-wide, off-route and wider effects

- 4.2.9 Each SES2 change and AP2 amendment has also been considered to determine its potential to give rise to any new or different significant route-wide and off-route environmental effects. Potential significant route-wide effects are reported in Volume 3 of the SES2 and AP2 ES. The climate, major accidents and natural disasters, and waste and material resources assessments are only reported at a route-wide level rather than in the Volume 2 community area reports. This follows the approach taken in the main ES and in the SES1 and AP1 ES.
- 4.2.10 A separate Volume 4: Off-route effects report has not been produced as part of the SES2 and AP2 ES. Any new or different off-route effects arising from the SES2 changes and AP2 amendments are reported in the most relevant Volume 2 community area report.
- 4.2.11 The Wider effects report in Volume 5 of the main ES (Appendix CT-005-000) assessed whether the power to deviate within statutory limits altered the significance of the effects as reported elsewhere in the main ES. The wider effects were also assessed for the AP1 amendments and consequently, a report was produced for the SES1 and AP1 ES (see SES1 and AP1 ES Volume 5, Appendix CT-005-000). The SES2 and AP2 ES mapping, contained within the Volume 2 and 5 Map Books, shows the HS2 route on the centre line for the scheduled works (that is, those works shown on the parliamentary plans and listed in Schedule 1 to the Bill). Limits of deviation shown on the Parliamentary plans and sections, as amended by the APs and described in the Bill, enable the HS2 route to deviate slightly from the centre line of the scheduled works as may be required following detailed design. In the case of non-scheduled (ancillary) works, the Bill also allows for some flexibility of movement within the limits of land to be acquired or used. For example, routes for non-scheduled utilities works (such as diversions of underground pipelines or telecommunications cables) may be



adjusted within the limits of land to be acquired and used. The degree of adjustment, as described above, is constrained by the Bill limits but also by engineering practicability and operational parameters.

- 4.2.12 The AP2 amendments were reviewed qualitatively in order to identify whether a deviation within the Bill limits for scheduled and non-scheduled works would alter the likely significant effects reported in the SES2 and AP2 ES by creating new or different likely significant effects. It was concluded that the changes do not affect the conclusions of the SES2 and AP2 ES and therefore a Wider effects report was not considered necessary.

### **General assumptions and limitations**

- 4.2.13 During the preparation of an ES, there are sometimes circumstances in which the information available to inform the assessment process is limited. For example, there is inevitably some uncertainty in predicting future baseline conditions, impacts and effects, especially given that this phase of the railway is not due to begin operating until 2027.
- 4.2.14 In addition, while it has been possible to access more land since the main ES, and SES1 and AP1 ES, were prepared, it has not been possible to carry out surveys on all of the land affected. It is considered that the baseline information is sufficient to allow a robust assessment of the likely significant environmental effects of the SES2 scheme and the AP2 revised scheme. Where appropriate, those assessments have been undertaken using a precautionary approach.
- 4.2.15 Where relevant for each environmental topic, key assumptions made in undertaking the assessment are explained and their consequences on the completeness or potential accuracy of the conclusions have been identified. Section 7.5 in Volume 1 of the main ES provides a description of general assumptions and limitations for each environmental topic, with further information in Section 4 of Volume 1 of the SES1 and AP1 ES.
- 4.2.16 In the SES2 and AP2 ES, for the assessment of transport and traffic-related effects, the modelling has used the route-wide earthworks and materials movement analysis. For a small number of AP2 amendments, which were incorporated since that analysis, the assessment has been undertaken using professional judgment, applying standard manual assessment techniques.
- 4.2.17 Local assumptions and limitations for the assessment of the SES2 changes and AP2 amendments are set out in the SES2 and AP2 ES Volume 2 community area reports.

## 5 Approach to appendices in the SES2 and the AP2 ES

- 5.1.1 As with Volume 5 of the main ES and the SES1 and AP1 ES, Volume 5 of the SES2 and the AP2 ES contains supporting environmental information in the form of appendices.
- 5.1.2 Generally, the SES2 and the AP2 ES appendices update the corresponding appendices within the main ES and SES1 and AP1 ES, and should, therefore, be read in conjunction with them. The SES2 and AP2 ES appendices do not repeat information contained within the relevant main ES or SES1 and AP2 ES appendices if that information does not require updating as a result of the changes within the SES2 and the AP2 ES (e.g. policy framework, information on methodologies etc.).
- 5.1.3 The Volume 5 appendices are generally structured as follows:
- Introduction
  - Part 1: SES2
    - New environmental baseline (where new environmental baseline has been collated related to the design reported in the main ES).
    - Supporting data to the assessment of the SES2 design changes.
  - Part 2: AP2 ES
    - Supporting data to the assessment of the AP2 amendments.
- 5.1.4 The appendices provide updated information for: committed and proposed development; agriculture, forestry and soils; air quality; climate change; community; cultural heritage; ecology and biodiversity; landscape and visual; sound, noise and vibration; traffic and transport; waste and material resources and water and flood risk.
- 5.1.5 Certain reports and maps containing background information and data (BID) have been produced, which do not form part of the SES2 and AP2 ES. These documents are available online at [www.gov.uk/hs2](http://www.gov.uk/hs2). The BID documents and maps present background survey information and other relevant background material.

## 6 Approach to mapping in the SES2 and the AP2 ES

- 6.1.1 Construction (CT-05) and operation (CT-06) mapping has been produced to indicate SES2 design changes and AP2 amendments. In each case, the relevant map from the main ES has been reproduced showing the original scheme and a second map produced showing the SES2 changes and the AP2 amendments<sup>17</sup>.
- 6.1.2 SES changes and AP amendments (now referred to as SES1 changes and AP1 amendments) were denoted in the SES and AP ES documents and maps as follows: SES-00X-00X or AP-00X-00X. In order to clearly distinguish between SES1 and SES2 changes and AP1 and AP2 amendments, references in the SES2 and AP2 ES documents and maps relating to SES1 changes and AP1 amendments are now denoted as follows: SES1-00X-00X or AP1-00X-00X.
- 6.1.3 On these maps, a colour coded 'cloud' system is used, where:
- a grey 'cloud' indicates the location of SES1 design changes and AP1 amendments;
  - a dark blue 'cloud' indicates the location of SES2 design changes; and
  - a red 'cloud' indicates the location of AP2 amendments.
- 6.1.4 For AP2 amendments the cloud generally only indicates the area that requires additional land or other changes to the Bill powers. Where a new or different residual significant effect has been identified, the cloud includes the full extent of the amendment.
- 6.1.5 Certain AP2 amendments have more than one cloud where there is additional land or other changes to Bill powers required at more than one location.
- 6.1.6 Other design changes that are within the existing powers of the Bill and do not result in any likely new or different residual significant environmental effects are also shown on the maps, but are not indicated by a cloud.
- 6.1.7 Where the SES2 design changes or AP2 amendments are temporary and only relevant to the construction phase, the clouds are shown on the CT-05 maps only. The corresponding CT-06 map is also included.
- 6.1.8 Where corrections to the main ES or SES1 and AP1 ES have resulted in an updated map (e.g. a correction to a construction traffic route), both the original map from the main ES and the corrected map are included in the relevant map book.
- 6.1.9 The updates to the CT-05 and CT-06 maps that were previously included in the Volume 4 Map Book (i.e. Off-route) are included in the most relevant Volume 2 Map Book.
- 6.1.10 The relevant environmental maps in the Volume 2 and 5 map books have been produced where a new or different likely residual significant environmental effect from that reported in the main ES or where relevant, the SES1 and AP1 ES is predicted

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<sup>17</sup> In the case of changes to the Phase One scheme at Handsacre, the appropriate HS2 Phase One maps are provided for comparison with the SES2 and AP2 ES maps.

to occur. Maps have also been produced when features, resources, receptors, or viewpoints have been added or removed compared to the main ES, or where relevant, the SES<sub>1</sub> and AP<sub>1</sub> ES. On the maps:

- red labels are used to show where there are any new residual significant effects;
- green labels are used to show when a residual significant effect is removed, and
- white labels are used to show any different residual significant effects.

- 6.1.11 The description on the labels indicates whether the change relates to a SES<sub>2</sub> design change or an AP<sub>2</sub> amendment. Changes to receptors or significant effects relating to SES<sub>1</sub> or AP<sub>1</sub> ES are also provided for reference. Where this is the case, these are shown in a faded box.
- 6.1.12 Additional environmental baseline and survey data that has become available for ecology and biodiversity, cultural heritage, traffic and transport and water resources and flood risk topics since the production of the SES<sub>1</sub> and AP<sub>1</sub> ES is also presented on the environmental maps, where relevant.
- 6.1.13 Maps have also been provided to identify relevant committed development that has been identified or approved since the production of the SES<sub>1</sub> and AP<sub>1</sub> ES.

# 7 Approach to mitigation and monitoring associated with the SES2 and the AP2 ES

## 7.1 Approach to mitigation

7.1.1 The measures that will be used to mitigate likely significant adverse environmental effects during construction and operation of the scheme are described in the main ES, SES1, AP1 ES and the draft Code of Construction Practice (CoCP), which sets out measures to manage and control the effects of construction<sup>18</sup>. The same approach to mitigation measures described in the main ES still applies.

7.1.2 Any new or different site specific mitigation measures are described within Volumes 2 and 3 of the SES2 and AP2 ES, where required.

## 7.2 Approach to monitoring

7.2.1 The Secretary of State for Transport will establish a set of controls known as Environmental Minimum Requirements (EMRs). The EMRs will include the final CoCP, which contains commitments to monitoring significant effects during construction. In addition, monitoring measures to be implemented during construction for each environmental topic are described in Volume 1, Section 9 of the main ES (e.g. monitoring dust and particulate matter in accordance with current best practice guidance and preparing groundwater and surface water monitoring plans where required). The same approach to monitoring measures described in the main ES still applies.

7.2.2 HS2 Ltd will carry out appropriate post-construction monitoring during the operational phase for both:

- 'general' monitoring, for example: mitigation provided for protected species; the progress of habitat creation works; the condition of restored agricultural land; and the establishment of landscape planting; and
- 'specific' monitoring agreed for particular significant adverse effects that may include, for example, monitoring of a public water supply borehole.

7.2.3 Operational monitoring measures for each environmental topic are described in Volume 1, Section 9 of the main ES. The general operational monitoring measures described in the main ES still apply.

7.2.4 Operational monitoring which relates to specific significant effects identified is set out in the relevant Volume 2 community area reports.

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<sup>18</sup> See main ES Volume 5: Appendix CT-003-000

## 8 Consultation on the SES2 and the AP2 ES

- 8.1.1 A formal public consultation is required by Parliament on both the SES2 and the AP2 ES. Consultees will have a period of at least 42 days within which to make representations following the deposit of the SES2 and AP2 ES in Parliament and the first publication of the necessary newspaper notices that follows. Parliamentary officials have appointed an independent assessor who will summarise the issues raised in representations received from members of the public and provide a report to Parliament before the Third Reading of the Bill. The SES2 and AP2 ES and details of how to respond to the consultation can be viewed at [www.gov.uk/hs2](http://www.gov.uk/hs2).
- 8.1.2 There will also be a separate petitioning period in relation to AP2. Within this period, persons whose property or interests are specially and directly affected by the amendments to the Bill for which powers are sought under AP2 have the right to petition against AP2.
- 8.1.3 More information on who may petition against AP2, and how to do so, is available on Parliament's website ([www.parliament.uk](http://www.parliament.uk)).

## 9 References

HS2 Ltd (2017), *High Speed Rail (West Midlands - Crewe) Environmental Statement*. Available online at: <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>.

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Volume 5: Technical appendices, Environmental Impact Assessment Scope and Methodology Report (Appendix CT-001-001)*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627187/E23\\_EIA\\_SMR\\_CT-001-001\\_WEB.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627187/E23_EIA_SMR_CT-001-001_WEB.pdf).

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Volume 5: Technical appendices, Borrow pits restoration strategy (CT-009-000)*. Available online at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627178/E30\\_CT\\_009\\_000\\_WEB.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627178/E30_CT_009_000_WEB.pdf)

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Volume 5: Technical appendices, Environmental Impact Assessment Scope and Methodology Report Addendum (Appendix CT-001-002)*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627189/E24-B\\_CT-001-002\\_Part\\_B\\_WEB.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627189/E24-B_CT-001-002_Part_B_WEB.pdf).

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Volume 5: Technical appendices, draft Code of Construction Practice (CT-003-000)*. Available online at: <https://www.gov.uk/government/publications/draft-code-of-construction-practice-for-hs2-phase-2a>.







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