

High Speed Rail (West Midlands - Crewe)

Supplementary Environmental Statement 2 and
Additional Provision 2 Environmental Statement

Volume 5: Technical appendices

Waste and material resources assessment
(WM-001-000)

High Speed Rail (West Midlands - Crewe)

Supplementary Environmental Statement 2 and
Additional Provision 2 Environmental Statement

Volume 5: Technical appendices

Waste and material resources assessment
(WM-001-000)



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.

High Speed Two (HS2) Limited,
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

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

ARUP



High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.

© High Speed Two (HS2) Limited, 2019, except where otherwise stated.

Copyright in the typographical arrangement rests with High Speed Two (HS2) Limited.

This information is licensed under the Open Government Licence v2.0. To view this licence, visit www.nationalarchives.gov.uk/doc/open-government-licence/version/2 **OGL** or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or e-mail: psi@nationalarchives.gsi.gov.uk. Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.



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

Contents

1	Introduction	1
1.1	Structure of this appendix	1
1.2	Scope of the assessment	2
1.3	Methodology, data sources, assumptions and limitations	2
1.4	Waste infrastructure capacity	3
1.5	Committed development	4
2	Fradley to Colton (CA1)	6
2.1	Local assumptions and limitations	6
2.2	Additional Provision 2 Environmental Statement	6
3	Colwich to Yarlet (CA2)	9
3.1	Local assumptions and limitations	9
3.2	Additional Provision 2 Environmental Statement	9
4	Stone and Swynnerton (CA3)	13
4.1	Local assumptions and limitations	13
4.2	Additional Provision 2 Environmental Statement	13
5	Whitmore Heath to Madeley (CA4)	17
5.1	Local assumptions and limitations	17
5.2	Additional Provision 2 Environmental Statement	17
6	South Cheshire (CA5)	20
6.1	Local assumptions and limitations	20
6.2	Additional Provision 2 Environmental Statement	20
7	References	24

List of tables

Table 1:	Baseline (2017) waste infrastructure capacity by county	3
Table 2:	Future baseline (2020 to 2027) landfill capacity by county	4
Table 3:	Forecast excavated material quantities in the Fradley to Colton area	6
Table 4:	Forecast demolition waste quantities to landfill in the Fradley to Colton area	7
Table 5:	Forecast construction waste quantities to landfill in the Fradley to Colton area	7
Table 6:	Forecast excavated material quantities in the Colwich to Yarlet area	9
Table 7:	Forecast demolition waste quantities to landfill in the Colwich to Yarlet area	10
Table 8:	Forecast construction waste quantities to landfill in the Colwich to Yarlet area	11

SES2 and AP2 ES Appendix WM-001-000

Table 9: Forecast excavated material quantities in the Stone and Swynnerton area	13
Table 10: Forecast demolition waste quantities to landfill in the Stone and Swynnerton area	14
Table 11: Forecast construction waste quantities to landfill in the Stone and Swynnerton area	15
Table 12: Forecast excavated material quantities in the Whitmore Heath to Madeley area	17
Table 13: Forecast demolition waste quantities to landfill in the Whitmore Heath to Madeley area	18
Table 14: Forecast construction waste quantities to landfill in the Whitmore Heath to Madeley area	18
Table 15: Forecast excavated material quantities in the South Cheshire area	20
Table 16: Forecast demolition waste quantities to landfill in the South Cheshire area	21
Table 17: Forecast construction waste quantities to landfill in the South Cheshire area	22

1 Introduction

1.1 Structure of this appendix

1.1.1 This document is an appendix to the route-wide waste and materials assessment which forms part of Volume 5 of the Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES).

1.1.2 This appendix provides details of changes to the route-wide waste and materials assessment since the production of the High Speed Two (HS2) Phase 2a (West Midlands - Crewe) Environmental Statement (ES)¹ published in July 2017 (the main ES), as well as the Supplementary Environmental Statement (SES1) and Additional Provision Environmental Statement (AP1 ES) published in March 2018².

1.1.3 This report should be read in conjunction with Volume 5, Appendix WM-001-000, which accompanied the main ES.

1.1.4 This appendix covers the following community areas (CA):

- CA1: Fradley to Colton;
- CA2: Colwich to Yarlet;
- CA3: Stone and Swynnerton;
- CA4: Whitmore Heath to Madeley; and
- CA5: South Cheshire.

1.1.5 In order to differentiate between the original proposals assessed as part of the main ES and subsequent changes, the following terms are used throughout the SES2 and AP2 ES to define the scheme as it relates to the HS2 Phase 2a project:

- '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 that are within the existing powers of the Bill, submitted to Parliament in March 2018;
- 'the AP1 revised scheme' – the SES1 scheme as amended by AP1 submitted to Parliament in March 2018;
- 'the SES2 scheme' – the SES1 scheme with the changes described in the SES2 that are within the existing powers of the Bill; and
- 'the AP2 revised scheme' – the SES2 scheme as amended by AP2.

1.1.6 However, other than in relation to committed development (see Section 1.5), only the first and last terms are used in this appendix as waste and material resources were not assessed as part of the SES1 scheme or the AP1 revised scheme and because the

¹ HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>

² HS2 Ltd (2018), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Supplementary Environmental Statement and Additional Provision Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-supplementary-environmental-statement-and-additional-provision-environmental-statement>

relevant information (i.e. waste forecasts) do not separately identify waste arisings associated with SES2 and with AP2 ES.

1.2 Scope of the assessment

1.2.1 This assessment presents more detailed information in relation to:

- the types and quantities of materials and waste that will be generated during the construction and operation of the AP2 revised scheme; and
- the estimated quantities of waste that will require off-site disposal to landfill during the construction and operation of the AP2 revised scheme.

1.2.2 The assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste generated during the construction and operation of the AP2 revised scheme has been undertaken on a route-wide and not a community area basis, as detailed within SES2 and AP2 ES Volume 3, Route-wide effects, Section 12.

1.3 Methodology, data sources, assumptions and limitations

1.3.1 The assessment scope, key assumptions and limitations are as set out in the main ES Environmental Impact Assessment Scope and Methodology Report and its Addendum (see main ES Volume 5, Appendix CT-001-001³ and Appendix CT-001-002⁴).

1.3.2 Local assumptions and limitations relating to each community area are set out in Sections 2 to 6.

1.3.3 Demolition material quantities have been estimated using the Waste and Resources Action Programme (WRAP) 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings. The landfill diversion rate for demolition waste has been selected based on a review of industry good practice landfill diversion rates of other large scale infrastructure projects in the UK (e.g. Crossrail, London 2012 Olympics and High Speed 1).

1.3.4 Construction waste quantities have been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction spend. This rate has been derived from industry-wide performance benchmark data procured from the Building Research Establishment Ltd (BRE). The landfill diversion rate for construction waste has been selected based on a review of industry good practice landfill diversion rates of other large scale infrastructure projects in the UK (e.g. Crossrail, London 2012 Olympics and High Speed 1).

1.3.5 Worker accommodation site waste has been forecast based on a waste generation rate of 0.027 tonnes per person per month. This rate has been derived from the average annual household waste generation in the UK of 407kg/person in 2015⁵ and

³ HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Impact Assessment Scope and Methodology Report, Volume 5: Appendix CT-001-001*,

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627187/E23_EIA_SMR_CT-001-001_WEB.pdf

⁴ HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Scope and Methodology Report Addendum, Volume 5: Appendix CT-001-002*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627188/E24A_CT-001-002_Part_1_WEB.pdf and https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627189/E24-B_CT-001-002_Part_B_WEB.pdf

⁵ Department for Environment Food and Rural Affairs (2017), *Digest of Waste and Resource Statistics – 2017 Edition (revised)*,

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/607416/Digest_of_Waste_and_Resource_Statistics_2017_rev.pdf

has been adjusted assuming an average 5.5 day working week⁶. The 2015 per capita waste generation rate represents the latest information available and is used to ensure comparability between the main ES and the AP2 ES.

1.4 Waste infrastructure capacity

Current baseline

- 1.4.1 Table 1 provides baseline waste infrastructure capacity for the counties through which the AP2 revised scheme will pass.

Table 1: Baseline (2017) waste infrastructure capacity by county

County	Landfill (tonnes)	Incineration (tonnes)	Waste treatment and transfer (tonnes)	Total
Staffordshire	15,632,190	670,000	2,006,491	18,308,681
Cheshire	8,957,674	1,050,000	2,529,566	12,537,240

- 1.4.2 The baseline information presented is based on permitted capacity for all types of waste treatment and disposal facilities for the year 2017, published by the Environment Agency⁷.

Future baseline

- 1.4.3 Table 2 provides the projected future baseline landfill capacity for inert, non-hazardous and hazardous landfill for the counties through which the AP2 revised scheme will pass.
- 1.4.4 As the future baseline provides the basis for the assessment and the assessment relates to the loss of finite waste management capacity, only landfill capacity is reported in Table 2 as incineration and waste treatment and transfer are processes rather than repositories.
- 1.4.5 Landfill capacity is reported by type of landfill waste (inert, non-hazardous and hazardous) as the assessment uses different significance criteria for each type of landfill.

⁶ Department for Environment, Food and Rural Affairs, *Waste and Recycling Statistics*, <https://www.gov.uk/government/collections/waste-and-recycling-statistics>

⁷ Environment Agency (2018), *Waste Management in England 2017*, <https://www.gov.uk/government/publications/waste-management-data-for-england>

Table 2: Future baseline (2020 to 2027) landfill capacity by county

Landfill type and county		2020	2026	2027
Inert landfill (tonnes)	Staffordshire	7,415,815	8,097,083	8,216,563
	Cheshire	1,047,488	630,636	579,496
Non-hazardous landfill (tonnes)	Staffordshire	7,643,868	5,916,290	5,678,927
	Cheshire	9,691,609	6,383,869	5,954,775
Hazardous landfill (tonnes)	Staffordshire	0	0	0
	Cheshire	2,079,939	1,747,177	1,697,141

1.4.6 Projected landfill capacity is based on the average percentage change in permitted landfill capacity for the years 2000 to 2017 (for inert and non-hazardous waste landfills) and for the years 2006 to 2017 (for hazardous waste landfill) as reported by the Environment Agency. The average percentage change has then been applied to the reported 2017 permitted landfill capacity and projected forward to 2027.

1.4.7 This method assumes that the average percentage change in permitted capacity for each class of landfill remains constant. Use of an average value taken from historical data also provides a reasonable allowance for potential future increases in permitted capacity for each class of landfill.

1.5 Committed development

1.5.1 Committed developments are defined as developments with planning permission; or sites allocated in adopted development plans.

1.5.2 The impact of potential waste arisings from committed development on the AP2 revised scheme is assessed as cumulative effects in SES2 and AP2 ES Volume 3, Route-wide effects, Section 12.

AP2 revised scheme and SES2 scheme

1.5.3 No separate assessment has been undertaken as data (i.e. waste forecasts) upon which the assessment would be based do not differentiate between wastes solely arising from the AP2 revised scheme and wastes solely arising from the SES2 scheme.

AP2 revised scheme and AP1 revised scheme

1.5.4 No cumulative assessment has been undertaken, as the Waste and material resources topic was scoped out from the AP1 revised scheme assessment.

AP2 revised scheme and HS2 Phase One

1.5.5 The construction waste arisings considered in the assessment of cumulative effects from the AP2 revised scheme, and HS2 Phase One as a committed development, relate to those construction waste arisings which will require off-site disposal to landfill in the West Midlands region. This being the only region through which both the Phase 2a and Phase One schemes pass. The cumulative effects of these

construction waste arisings are considered in SES2 and AP2 ES Volume 3, Route-wide effects.

- 1.5.6 The operational waste arisings considered in the assessment of cumulative effects from the original scheme and HS2 Phase One as committed development are as set out in Volume 5, Technical Appendices - Appendix WM-001-000 of the main ES. The cumulative effects of these operational waste arisings and those from the AP2 revised scheme are considered in SES2 and AP2 ES Volume 3, Route-wide effects.

AP2 revised scheme and other committed developments

- 1.5.7 The methodology used to develop the future baseline landfill capacities during the proposed construction period takes account of waste generation trends driven by developments in the respective regional areas. It is considered that none of the committed developments is of sufficient scale to disrupt these trends, they are therefore considered to comprise part of the future baseline.

2 Fradley to Colton (CA1)

2.1 Local assumptions and limitations

2.1.1 There are no local assumptions or limitations specific to the Fradley to Colton area.

2.2 Additional Provision 2 Environmental Statement

Effects during construction

Excavated material

2.2.1 Based on the integrated engineering earthworks design approach, described in the main ES Volume 1, Introduction and methodology, Section 6, the construction of the AP2 revised scheme is forecast to generate a total of 10,360,799 tonnes of excavated material within the Fradley to Colton area, as shown in Table 3.

Table 3: Forecast excavated material quantities in the Fradley to Colton area

Excavated material types ⁸	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to off-site landfill (tonnes) ⁹
Selected fill	3,124,488	N/A
General engineering fill	4,258,450	N/A
Environmental mitigation earthworks fill	942,988	N/A
Topsoil	892,715	N/A
Agricultural subsoil	998,560	N/A
Unacceptable material Class U1A	127,484	N/A
Unacceptable material Class U1B	15,357	N/A
Unacceptable material Class U2	756	756
Total ¹⁰	10,360,799	756

2.2.2 Virtually all excavated material that will be generated in the Fradley to Colton area is expected to be suitable for beneficial reuse as engineering fill material, in the environmental mitigation earthworks, or in backfilling borrow pits included within the AP2 revised scheme.

2.2.3 Approximately 62% of the excavated material generated in the Fradley to Colton area is expected to arise from the five borrow pits proposed in the area.

⁸ Department for Transport, Highways Agency, *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 600 Earthworks*, <http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>

⁹ Only includes the quantity of unacceptable material class U2, which is unsuitable for reuse with the AP2 revised scheme. All other material has the potential to be reused within the AP2 revised scheme; therefore no quantity can be defined as surplus for disposal to landfill. Indicated by N/A (not applicable)

¹⁰ Numbers do not sum to total due to rounding

- 2.2.4 To manage a route-wide excess of cohesive material, 697,357 tonnes of excavated material will be deposited in five local placement sites in the Fradley to Colton area.
- 2.2.5 A proportion of the excavated material in the Fradley to Colton area is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials (i.e. unacceptable material Class U1B) or the hazardous properties of the material (i.e. unacceptable material Class U2). As a worst case scenario it has been assumed that all Class U2 material will be disposed of at off-site landfill.

Demolition material and waste

- 2.2.6 The types of building demolitions required within the Fradley to Colton area are listed in Table 4 together with estimated demolition material quantities.
- 2.2.7 The construction of the AP2 revised scheme is forecast to generate a total of 9,904 tonnes of demolition material within the Fradley to Colton area (see Table 4).
- 2.2.8 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities.

Table 4: Forecast demolition waste quantities to landfill in the Fradley to Colton area

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to off-site landfill (tonnes)
Non-residential property (industrial units and commercial property)	7,518	752
Residential property	2,386	239
Bridges	0	0
Miscellaneous	0	0
Total	9,904	991

Construction waste

- 2.2.9 The construction of the AP2 revised scheme is forecast to generate a total of 72,051 tonnes of construction waste within the Fradley to Colton area (see Table 5).
- 2.2.10 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 5: Forecast construction waste quantities to landfill in the Fradley to Colton area).

Table 5: Forecast construction waste quantities to landfill in the Fradley to Colton area

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to off-site landfill (tonnes)
Pyford Brook Viaduct satellite compound	2,157	216
Pyford Brook utility compound	220	22

SES2 and AP2 ES Appendix WM-001-000

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to off-site landfill (tonnes)
Common Lane utility compound	1,862	186
Pyford North Embankment satellite compound	4,390	439
Lichfield Road utility compound	925	93
Bourne Embankment satellite compound	10,850	1,085
River Trent Viaduct satellite compound	14,788	1,479
Pipe Ridware Embankment satellite compound	5,539	554
Pipe Lane utility compound	1,536	154
Blithbury Central Cutting satellite compound	6,007	601
Blithbury North Cutting satellite compound	15,007	1,501
Stockwell Heath Cutting satellite compound	5,677	568
Moreton Brook Viaduct satellite compound	1,464	146
Jonghams Lane utility compound	980	98
Bourne Brook ATS RS compound	114	11
Pipe Ridware ATS RS compound	114	11
Blithbury Crossovers RS compound	15	2
Newlands Lane compound	405	41
Total ¹¹	72,051	7,205

Worker accommodation site waste

- 2.2.11 There will be no worker accommodation sites in the Fradley to Colton area and therefore no waste will be generated from this source.

Effects arising during operation

- 2.2.12 None of the AP2 amendments result in a change to the operational waste generated by the original scheme in the Fradley to Colton area, as reported in Volume 5, Appendix WM-001-000 of the main ES.

¹¹ Numbers do not sum to total due to rounding

3 Colwich to Yarlet (CA2)

3.1 Local assumptions and limitations

3.1.1 There are no local assumptions or limitations specific to the Colwich to Yarlet area.

3.2 Additional Provision 2 Environmental Statement

Effects during construction

Excavated material

3.2.1 Based on the integrated engineering earthworks design approach, described in the main ES Volume 1, Introduction and methodology, Section 6, the construction of the AP2 revised scheme is forecast to generate a total of 8,704,523 tonnes of excavated material within the Colwich to Yarlet area, as shown in Table 6.

Table 6: Forecast excavated material quantities in the Colwich to Yarlet area

Excavated material types ¹²	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to off-site landfill (tonnes) ¹³
Selected fill	1,042,422	N/A
General engineering fill	5,725,396	N/A
Environmental mitigation earthworks fill	942,447	N/A
Topsoil	799,662	N/A
Agricultural subsoil	123,018	N/A
Unacceptable material Class U1A	5,586	N/A
Unacceptable material Class U1B	65,047	N/A
Unacceptable material Class U2	947	947
Total ¹⁴	8,704,523	947

3.2.2 Virtually all excavated material that will be generated in the Colwich to Yarlet area is expected to be suitable for beneficial reuse as engineering fill material, in the environmental mitigation earthworks, or in backfilling borrow pits as part of the AP2 revised scheme.

¹² Department for Transport, Highways Agency, *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 600 Earthworks*, <http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>

¹³ Only includes the quantity of unacceptable material class U2, which is unsuitable for reuse with the AP2 revised scheme. All other material have the potential to be reused within the AP2 revised scheme; therefore no quantity can be defined as surplus for disposal to landfill. Indicated by N/A (not applicable)

¹⁴ Numbers do not sum to total due to rounding

- 3.2.3 Approximately 75% of the excavated material arising in the Colwich to Yarlet area is expected to be generated by four large cuttings:
- Moreton cutting;
 - Brancote South cutting;
 - Hopton South cutting; and
 - Hopton North cutting.
- 3.2.4 To manage a route-wide excess of cohesive material, 220,469 tonnes of excavated material will be deposited in six local placement sites in the Colwich to Yarlet area.
- 3.2.5 A very small proportion of the excavated material in the Colwich to Yarlet area is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials (i.e. unacceptable material Class U1B) or the hazardous properties of the material (i.e. unacceptable material Class U2). As a worst case scenario it has been assumed that all Class U2 material will be disposed of at off-site landfill.

Demolition material and waste

- 3.2.6 The types of building demolitions required within the Colwich to Yarlet area are listed in Table 7 together with estimated demolition material quantities.
- 3.2.7 The construction of the AP2 revised scheme is forecast to generate a total of 62,779 tonnes of demolition material within the Colwich to Yarlet area (see Table 7).
- 3.2.8 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities.

Table 7: Forecast demolition waste quantities to landfill in the Colwich to Yarlet area

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to off-site landfill (tonnes)
Non-residential property (industrial units and commercial property)	47,957	4,796
Residential property	8,817	883
Bridges	0	0
Miscellaneous	6,005	601
Total	62,779	6,280

Construction waste

- 3.2.9 The construction of the AP2 revised scheme is forecast to generate a total of 68,895 tonnes of construction waste within the Colwich to Yarlet area (see Table 8).
- 3.2.10 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities.

SES2 and AP2 ES Appendix WM-001-000

Table 8: Forecast construction waste quantities to landfill in the Colwich to Yarlet area

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to off-site landfill (tonnes)
Trent South utility compound	3,205	321
Trent South Embankment Main compound	22,083	2,208
Main Road utility compound	340	34
Trent North Embankment satellite compound	5,114	511
Trent North utility compound	2,220	222
Hanyards Lane utility compound	548	55
Ingestre Park Road utility compound	1,682	168
Brancote South Cutting satellite compound	7,473	747
Hopton South Cutting satellite compound	7,542	754
Hopton North Cutting satellite compound	6,110	611
Sandon Road utility compound	311	31
Marston Lane utility compound	1,663	166
Marston South Embankment satellite compound	3,861	386
Marston North Embankment satellite compound	1,962	196
Yarlet South Cutting satellite compound	4,328	433
Moreton auto-transformer station satellite compound	114	11
Mill Lane auto-transformer station compound	114	11
Sandon Road auto-transformer station satellite compound	114	11
Yarlet express feeder auto-transformer station satellite compound	114	11
Total ³⁵	68,895	6,890

³⁵ Numbers do not sum to total due to rounding

Worker accommodation site waste

- 3.2.11 There is one worker accommodation site proposed in the Colwich to Yarlet area, located at the Trent South embankment main compound. The worker accommodation site is expected to generate 330 tonnes of waste. A landfill diversion rate of 50% has been applied to the estimated worker accommodation site waste quantities hence 165 tonnes is forecast to require off-site disposal to landfill.
- 3.2.12 The landfill diversion rate has been selected based on local authority household waste recycling rates.

Effects arising during operation

- 3.2.13 None of the AP2 amendments result in a change to the operational waste generated by the original scheme in the Colwich to Yarlet area, as reported in Volume 5, Appendix WM-001-000 of the main ES.

4 Stone and Swynnerton (CA3)

4.1 Local assumptions and limitations

4.1.1 There are no local assumptions or limitations specific to the Stone and Swynnerton area.

4.2 Additional Provision 2 Environmental Statement Effects during construction

Excavated material

4.2.1 Based on the integrated engineering earthworks design approach, described in the main ES Volume 1, Introduction and methodology, Section 6, the construction of the AP2 revised scheme is forecast to generate a total of 11,302,339 tonnes of excavated material within the Stone and Swynnerton area, as shown in Table 9.

Table 9: Forecast excavated material quantities in the Stone and Swynnerton area

Excavated material types ¹⁶	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to off-site landfill (tonnes) ¹⁷
Selected fill	598,043	N/A
General engineering fill	7,032,996	N/A
Environmental mitigation earthworks fill	1,396,516	N/A
Topsoil	1,226,089	N/A
Agricultural subsoil	197,675	N/A
Unacceptable material Class U1A	767,725	N/A
Unacceptable material Class U1B	79,839	N/A
Unacceptable material Class U2	3,460	3,460
Total ¹⁸	11,302,339	3,460

4.2.2 Virtually all excavated material that will be generated in the Stone and Swynnerton area is expected to be suitable for beneficial reuse as engineering fill material, in the environmental mitigation earthworks, or in backfilling borrow pits as part of the AP2 revised scheme.

¹⁶ Department for Transport, Highways Agency, *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 600 Earthworks*, <http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>

¹⁷ Only includes the quantity of unacceptable material class U2, which is unsuitable for reuse with the AP2 revised scheme. All other material have the potential to be reused within the AP2 revised scheme; therefore no quantity can be defined as surplus for disposal to landfill. Indicated by N/A (not applicable)

¹⁸ Numbers do not sum to total due to rounding

- 4.2.3 Approximately 74% of the excavated material arising in the Stone and Swynnerton area is expected to be generated by four scheme elements:
- Yarlet North cutting;
 - Stone headshunt;
 - Stone IMBR; and
 - Swynnerton North cutting.
- 4.2.4 To manage a route-wide excess of cohesive material, 382,183 tonnes of excavated material will be deposited in four local placement sites in the Stone and Swynnerton area.
- 4.2.5 A small proportion of the excavated material in the Stone and Swynnerton area is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials (i.e. unacceptable material Class U1B) or the hazardous properties of the material (i.e. unacceptable material Class U2). As a worst case scenario it has been assumed that all Class U2 material will be disposed of at off-site landfill.

Demolition material and waste

- 4.2.6 The types of building and structure demolitions required within the Stone and Swynnerton area are listed in Table 10 together with estimated demolition material quantities.
- 4.2.7 The construction of the AP2 revised scheme is forecast to generate a total of 31,182 tonnes of demolition material within the Stone and Swynnerton area (see Table 10).
- 4.2.8 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities.

Table 10: Forecast demolition waste quantities to landfill in the Stone and Swynnerton area

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Non-residential property (industrial units and commercial property)	7,582	758
Residential property	4,620	462
Bridges	4,423	442
Miscellaneous	14,557	1,456
Total	31,182	3,118

Construction waste

4.2.9 The construction of the AP2 revised scheme is forecast to generate a total of 116,090 tonnes of construction waste within the Stone and Swynnerton area (see Table 11).

4.2.10 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities.

Table 11: Forecast construction waste quantities to landfill in the Stone and Swynnerton area

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Yarlet utility compound	1,470	147
Yarlet Embankment satellite compound	7,122	712
Yarlet North Cutting satellite compound	21,211	2,121
Yarnfield North Embankment satellite compound	43,015	4,302
M6 Meaford Viaduct satellite compound	3,367	337
Meaford North Embankment satellite compound	11,386	1,139
Swynnerton utility compounds – 1no north and 1no south of M6	862	86
Swynnerton Embankment satellite compound	2,946	295
Tittensor Road utility compound	1,263	126
Swynnerton North Cutting main compound	9,147	915
Trentham Road off route highway modifications compound	0	0
Hatton South Cutting satellite compound	8,167	817
Hatton North Cutting satellite compound	3,552	355
Bent Lane utility compound	964	96
Stone Crossovers RS compound	15	2
Stone Connection RS compound	19	2
Stone railhead	1,355	136
Swynnerton ATS RS compound	114	11

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Stableford MPATS RS compound	114	11
Total ¹⁹	116,090	11,609

Worker accommodation site waste

- 4.2.11 There is one worker accommodation site proposed in the Stone and Swynnerton area, located at the Yarnfield North Embankment satellite compound. The worker accommodation site is expected to generate 330 tonnes of waste. A landfill diversion rate of 50% has been applied to the estimated worker accommodation site waste quantities hence 165 tonnes is forecast to require off-site disposal to landfill.
- 4.2.12 The landfill diversion rate has been selected based on local authority household waste recycling rates.

Effects arising during operation

- 4.2.13 None of the AP2 changes result in a change to the operational waste generated by the original scheme in the Stone and Swynnerton area, as reported in Volume 5, Appendix WM-001-000 of the main ES.

¹⁹ Numbers do not sum to total due to rounding

5 Whitmore Heath to Madeley (CA4)

5.1 Local assumptions and limitations

5.1.1 There are no local assumptions or limitations specific to the Whitmore Heath to Madeley area.

5.2 Additional Provision 2 Environmental Statement Effects during construction

Excavated material

5.2.1 Based on the integrated engineering earthworks design approach, described in the main ES Volume 1, Introduction and methodology, Section 6, the construction of the AP2 revised scheme is forecast to generate a total of 9,610,331 tonnes of excavated material within the Whitmore Heath to Madeley area, as shown in Table 12.

Table 12: Forecast excavated material quantities in the Whitmore Heath to Madeley area

Excavated material types ²⁰	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to off-site landfill (tonnes) ²¹
Selected fill	1,298,085	N/A
General engineering fill	5,954,434	N/A
Environmental mitigation earthworks fill	767,319	N/A
Topsoil	687,241	N/A
Agricultural subsoil	632,682	N/A
Unacceptable material Class U1A	270,478	N/A
Unacceptable material Class U1B	92	N/A
Unacceptable material Class U2	0	0
Total	9,610,331	0

5.2.2 All of the excavated material that will be generated in the Whitmore Heath to Madeley area is expected to be suitable for beneficial reuse as engineering fill material, in the environmental mitigation earthworks, or in backfilling borrow pits as part of the AP2 revised scheme.

²⁰ Department for Transport, Highways Agency, *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 600 Earthworks*, <http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>

²¹ Only includes the quantity of unacceptable material class U2, which is unsuitable for reuse with the AP2 revised scheme. All other material have the potential to be reused within the AP2 revised scheme; therefore no quantity can be defined as surplus for disposal to landfill. Indicated by N/A (not applicable)

5.2.3 Approximately 42% of the excavated material generated in the Whitmore Heath to Madeley area is expected to arise from the borrow pit proposed in the area.

5.2.4 To manage a route-wide excess of cohesive material, 401,541 tonnes of excavated material will be deposited in a single local placement site in the Whitmore Heath to Madeley area.

Demolition material and waste

5.2.5 The types of building demolitions required within the Whitmore Heath to Madeley area are listed in Table 13 together with estimated demolition material quantities. The construction of the AP2 revised scheme is forecast to generate a total of 7,385 tonnes of demolition material within the Whitmore Heath to Madeley area (see Table 13).

5.2.6 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities.

Table 13: Forecast demolition waste quantities to landfill in the Whitmore Heath to Madeley area

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to off-site landfill (tonnes)
Non-residential property (industrial units and commercial property)	1,053	105
Residential property	4,659	466
Bridges	0	0
Miscellaneous	1,673	167
Total	7,385	738

Construction waste

5.2.7 The construction of the AP2 revised scheme is forecast to generate a total of 96,649 tonnes of construction waste within Whitmore Heath to Madeley area (see Table 14).

5.2.8 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities.

Table 14: Forecast construction waste quantities to landfill in the Whitmore Heath to Madeley area

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Stableford North Embankment satellite compound	7,286	729
Whitmore Heath Tunnel satellite compound	26,241	2,624
Whitmore North Cutting satellite compound	9,129	913
River Lea Viaduct satellite compound	13,211	1,321

SES2 and AP2 ES Appendix WM-001-000

Manor Road satellite compound	3,749	375
Madeley Cutting satellite compound	3,749	375
Madeley Tunnel (South) satellite compound	13,624	1,362
Madeley Tunnel (North) satellite compound	10,590	1,059
Checkley South Embankment satellite compound	8,411	841
Whitmore Heath tunnel south portal satellite compound	62	6
Whitmore Heath tunnel north portal satellite compound	136	14
Whitmore North auto-transformer station satellite compound	114	11
Madeley Tunnel South Portal RS compound	62	6
Madeley Tunnel north portal satellite compound	285	29
Total	96,649	9,665

Worker accommodation site waste quantities

- 5.2.9 There will be no worker accommodation sites in the Whitmore Heath to Madeley area and therefore no waste will be generated from this source.

Effects arising during operation

- 5.2.10 None of the AP2 changes result in a change to the operational waste generated by the original scheme in the Whitmore Heath to Madeley area, as reported in Volume 5, Appendix WM-001-000 of the main ES.

6 South Cheshire (CA5)

6.1 Local assumptions and limitations

6.1.1 There are no local assumptions or limitations specific to the South Cheshire area.

6.2 Additional Provision 2 Environmental Statement

Effects during construction

Excavated material

6.2.1 Based on the integrated engineering earthworks design approach, described in the main ES Volume 1, Introduction and methodology, Section 6, the construction of the AP2 revised scheme is forecast to generate a total of 5,434,964 tonnes of excavated material within the South Cheshire area, as shown in Table 15.

Table 15: Forecast excavated material quantities in the South Cheshire area

Excavated material types ²²	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to off-site landfill (tonnes) ²³
Selected fill	164,839	N/A
General engineering fill	3,013,437	N/A
Environmental mitigation earthworks fill	840,702	N/A
Topsoil	793,050	N/A
Agricultural subsoil	556,144	N/A
Unacceptable material Class U1A	48,210	N/A
Unacceptable material Class U1B	17,832	N/A
Unacceptable material Class U2	749	749
Total ²⁴	5,434,964	749

6.2.2 Virtually all excavated material that will be generated in the South Cheshire area is expected to be suitable for beneficial reuse as engineering fill material, in the environmental mitigation earthworks, or in backfilling borrow pits of the AP2 revised scheme.

²² Department for Transport, Highways Agency, *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 600 Earthworks*, <http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>

²³ Only includes the quantity of unacceptable material class U2, which is unsuitable for reuse with the AP2 revised scheme. All other material have the potential to be reused within the AP2 revised scheme; therefore no quantity can be defined as surplus for disposal to landfill. Indicated by N/A (not applicable)

²⁴ Numbers do not sum to total due to rounding

- 6.2.3 Approximately 26% of the excavated material generated in the South Cheshire area is expected to arise from the borrow pit proposed in the area.
- 6.2.4 To manage a route-wide excess of cohesive material, 290,470 tonnes of excavated material will be deposited in four local placement sites in the South Cheshire area.
- 6.2.5 A very small proportion of the excavated material in the South Cheshire area is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials (i.e. unacceptable material Class U1B) or the hazardous properties of the material (i.e. unacceptable material Class U2). As a worst case scenario it has been assumed that all Class U2 material will be disposed of at off-site landfill.

Demolition material and waste

- 6.2.6 Types of building and structure demolitions required within the South Cheshire area are listed in Table 16 together with estimated demolition material quantities.
- 6.2.7 The construction of the AP2 revised scheme is forecast to generate a total of 20,577 tonnes of demolition material within the South Cheshire area (see Table 16).
- 6.2.8 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities.

Table 16: Forecast demolition waste quantities to landfill in the South Cheshire area

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Non-residential property (industrial units and commercial property)	8,506	851
Residential property	0	0
Bridges	12,071	1,207
Miscellaneous	0	0
Total	20,577	2,058

Construction waste quantities

- 6.2.9 The construction of the AP2 revised scheme is forecast to generate a total of 87,036 tonnes of construction waste within the South Cheshire area (see Table 17).
- 6.2.10 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities.

SES2 and AP2 ES Appendix WM-001-000

Table 17: Forecast construction waste quantities to landfill in the South Cheshire area

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Checkley North Embankment satellite compound	5,073	507
Checkley Lane utility compound	2,157	216
Den Lane utility compound A	1,458	146
Blakenhall Northbound Spur Embankment satellite compound	22,294	2,229
Den Lane utility compound B	2,232	223
Blakenhall Cutting satellite compound (WCML)	5,112	511
Crewe South Cutting satellite compound	19,422	1,942
Chorlton Lane utility compound	1,986	199
Newcastle Road utility compound	1,470	147
Chorlton Cutting satellite compound	2,438	244
Crewe South Portal satellite compound	4,133	413
Basford Cutting Main compound	2,901	290
Checkley Lane West RS compound	73	7
Checkley Lane East RS main compound	106	11
Den Lane Welfare RS compound	56	6
Den Lane East RS compound (NR Betley Road SB access point)	65	7
Den Lane West RS compound (NR Betley Road - Den Lane access point)	112	11
Delta Junction RS compound	48	5
South Crewe MPATS RS compound	274	27
Waybutt Lane RS compound	79	8
Swill Brook RS compound	15	2

SES2 and AP2 ES Appendix WM-001-000

Construction compound	Estimated construction waste quantity (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Heath Farm RS compound	28	3
Creamery Bridge RS compound	246	25
Casey Lane West RS compound	56	6
Casey Lane East RS compound	43	4
Basford Hall SB RS compound	103	10
Crewe South Crossovers RS compound	176	18
Motorail Terminal	14,753	1,475
Alexandra Stadium	127	13
Total	87,036	8,704

Worker accommodation site waste quantities

- 6.2.11 There is one worker accommodation site proposed in the South Cheshire area, located at the Basford Cutting main compound. The worker accommodation site is expected to generate 428 tonnes of waste. A landfill diversion rate of 50% has been applied to the estimated worker accommodation site waste quantities hence 214 tonnes is forecast to require off-site disposal to landfill.
- 6.2.12 The landfill diversion rate has been selected based on local authority household waste recycling rates.

Effects arising during operation

- 6.2.13 None of the AP2 changes result in a change to the operational waste generated by the original scheme in the South Cheshire area, as reported in Volume 5, Appendix WM-001-000 of the main ES.

7 References

British Standard Institution (2005), *BS5906:2005 Waste Management in Buildings – Code of Practice*.

Building Research Establishment Ltd (2013), *Construction Waste Benchmarks for Railway Projects*.

Department for Environment Food and Rural Affairs (2016), *Digest of Waste and Resource Statistics – 2016 Edition (revised)*. Available online at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/508787/Digest_of_Waste_and_Resource_Statistics_rev.pdf.

Department for Environment, Food and Rural Affairs (2013), *Waste and Recycling Statistics*.

Available online at: <https://www.gov.uk/government/collections/waste-and-recycling-statistics>.

Department for Transport, Highways Agency, *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works; Series 600 Earthworks*. Available online at:

<http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>.

Environment Agency (2015), *Waste Management Information 2015*. Available online at:

<https://www.gov.uk/government/statistics/waste-management-for-england-2015>.

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (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), Scope and Methodology Report, Volume 5: Appendix CT-001-001*. Available online at:

https://assets.publishing.service.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), Scope and Methodology Report Addendum, Volume 5: Appendix CT-001-002*. Available online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627188/E24A_CT-001-002_Part_1_WEB.pdf and

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627189/E24-B_CT-001-002_Part_B_WEB.pdf.

HS2 Ltd (2018), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Supplementary Environmental Statement and Additional Provision Environmental Statement*. Available online at:

<https://www.gov.uk/government/collections/hs2-phase-2a-supplementary-environmental-statement-and-additional-provision-environmental-statement>.

LRS Consultancy Limited (2014), *Cheshire East Borough Council - Waste Management Needs Assessment*.

Staffordshire County Council (2013), *Staffordshire and Stoke-on-Trent Joint Waste Local Plan 2010–2026 - Appendix 6: Waste Data Tables*.

Waste and Resources Action Programme, *Net Waste Tool*. Available online at:

<http://nwtool.wrap.org.uk>.

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

08081 434 434
HS2Enquiries@hs2.org.uk
www.hs2.org.uk