

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement and
Additional Provision 2 Environmental Statement
Volume 3 | Route-wide effects

July 2015

SES and AP2 ES 3.3



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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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Contents

| | |
|--|-----------|
| Structure of the HS2 Supplementary Environmental Statement and Additional Provision 2 Environmental Statement | 1 |
| 1 Introduction | 3 |
| 1.1 Introduction to the SES and AP2 ES for High Speed Two Phase One | 3 |
| 1.2 Terminology used to describe the scheme | 3 |
| 1.3 Scope of this report | 4 |
| 1.4 Structure of this report | 5 |
| Part 1: Supplementary Environmental Statement | 7 |
| 2 The Chilterns Area of Outstanding Natural Beauty | 7 |
| 2.1 Introduction | 7 |
| 2.2 Changes to the assessment of effects | 7 |
| 3 Agriculture, forestry and soils | 8 |
| 3.1 Introduction | 8 |
| 3.2 Changes to the assessment of effects | 8 |
| 4 Climate | 9 |
| 4.1 Introduction | 9 |
| 4.2 Changes to the assessment of effects | 9 |
| 5 Ecology | 10 |
| 5.1 Introduction | 10 |
| 5.2 Changes to the assessment of effects | 10 |
| 6 Landscape and visual assessment | 14 |
| 6.1 Introduction | 14 |
| 6.2 Changes to the assessment of effects | 14 |
| 7 Socio-economics | 15 |
| 7.1 Introduction | 15 |
| 7.2 Changes to the assessment of effects | 15 |
| 8 Traffic and transport | 16 |
| 8.1 Introduction | 16 |

| | | |
|---|---|-----------|
| 8.2 | Changes to the assessment of effects | 16 |
| 9 | Waste and material resources | 18 |
| 9.1 | Introduction | 18 |
| 9.2 | Changes to the assessment of effects | 18 |
| 10 | Water resources and flood risk assessment | 19 |
| 10.1 | Introduction | 19 |
| 10.2 | Changes to the assessment of effects | 20 |
| 11 | Phase One and Phase Two combined impacts | 22 |
| 11.1 | Introduction | 22 |
| 11.2 | Summary of changes to combined impacts | 22 |
| Part 2: Additional Provision 2 Environmental Statement | | 23 |
| 12 | The Chilterns Area of Outstanding Natural Beauty | 23 |
| 12.1 | Introduction | 23 |
| 12.2 | Changes to the assessment of effects | 23 |
| 13 | Agriculture, forestry and soils | 25 |
| 13.1 | Introduction | 25 |
| 13.2 | Changes to the assessment of effects | 25 |
| 14 | Climate | 26 |
| 14.1 | Introduction | 26 |
| 14.2 | Scope, assumptions and limitations | 26 |
| 14.3 | Carbon footprint methodology | 27 |
| 14.4 | GHG implications of AP2 amendments | 27 |
| 14.5 | Conclusions | 27 |
| 15 | Ecology | 29 |
| 15.1 | Introduction | 29 |
| 15.2 | Changes to the assessment of effects | 29 |
| 16 | Landscape and visual assessment | 33 |
| 16.1 | Introduction | 33 |
| 16.2 | Changes to the assessment of effects | 33 |
| 17 | Socio-economics | 34 |
| 17.1 | Introduction | 34 |
| 17.2 | Changes to the assessment of effects | 34 |
| 18 | Traffic and transport | 35 |
| 18.1 | Introduction | 35 |
| 18.2 | Changes to the assessment of effects | 35 |
| 19 | Waste and material resources | 36 |
| 19.1 | Introduction | 36 |
| 19.2 | Policy framework | 36 |
| 19.3 | Scope, assumptions and limitations | 37 |
| 19.4 | Assessment methodology | 37 |

| | | |
|-----------|--|-----------|
| 19.5 | Environmental baseline | 38 |
| 19.6 | Assessment of effects during construction | 42 |
| 19.7 | Assessment of effects during operation | 60 |
| 20 | Water resources and flood risk assessment | 61 |
| 20.1 | Introduction | 61 |
| 20.2 | Changes to the assessment of effects | 62 |
| 21 | Phase One and Phase Two combined impacts | 64 |
| 21.1 | Introduction | 64 |
| 21.2 | Summary of changes to combined impacts | 64 |
| 22 | References | 68 |

List of figures

| | | |
|-----------|---|----|
| Figure 1: | Projected (future baseline) inert waste landfill capacity by region | 40 |
| Figure 2: | Projected (future baseline) non-hazardous waste landfill capacity by region | 41 |
| Figure 3: | Projected (future baseline) hazardous waste landfill capacity by region | 42 |

List of tables

| | | |
|-----------|--|----|
| Table 1: | Summary of route-wide corrections to the main ES | 16 |
| Table 2: | HS2 construction emissions (tCO ₂ e) comparison between the original scheme and the AP2 revised scheme | 27 |
| Table 3: | Baseline waste infrastructure capacity by region, 2013 | 38 |
| Table 4: | Sustainable placement areas for the AP2 revised scheme | 43 |
| Table 5: | Forecast excavated material quantities for the original scheme and AP2 revised scheme, 2017 to 2025 | 43 |
| Table 6: | Quantity of surplus excavated material requiring off-site disposal to landfill (by class of landfill) original scheme and AP2 revised scheme, 2017 to 2025 | 44 |
| Table 7: | Forecast demolition material and waste quantities (by region) for the original scheme and AP2 revised scheme, 2017 to 2025 | 46 |
| Table 8: | Quantity of demolition waste requiring off-site disposal to landfill (by class of landfill), original scheme and AP2 revised scheme, 2017 to 2025 | 46 |
| Table 9: | Forecast construction waste quantities (by region) original scheme and AP2 revised scheme, 2017 to 2025 | 47 |
| Table 10: | Forecast worker accommodation site waste quantities (by region) original scheme and AP2 revised scheme, 2017 to 2025 | 48 |
| Table 11: | Summary of material and waste quantities that will be generated by excavation, demolition and construction of the original scheme and AP2 revised scheme, 2017 to 2025 | 49 |
| Table 12: | Impact of material and waste quantities that will be generated by excavation, demolition and construction of the original scheme and AP2 revised scheme, 2017 to 2025 | 50 |
| Table 13: | Impact of C&I waste arisings generated for the original scheme and combined AP2 revised scheme, 2017 to 2025 | 51 |
| Table 14: | Quantity of waste requiring off-site disposal to inert waste landfill for the original scheme and AP2 revised scheme, 2017 to 2025 | 52 |

| | |
|---|----|
| Table 15: Locations (by regional and local area) for the off-site disposal to landfill of inert surplus excavated material, 2017 to 2025 | 53 |
| Table 16: Quantity of waste requiring off-site disposal to non-hazardous waste landfill for the original scheme and combined AP2 revised scheme, 2017 to 2025 | 54 |
| Table 17: Quantity of waste requiring off-site disposal to hazardous waste landfill for the original scheme and AP2 revised scheme, 2017 to 2025 | 56 |
| Table 18: Quantity of waste for off-site disposal to landfill by waste type for the original scheme and AP2 revised scheme, 2017 to 2025 | 57 |
| Table 19: Combined impacts of Phase One (original scheme and AP2 revised scheme) and Phase Two | 64 |

Structure of the HS2 Supplementary Environmental Statement and Additional Provision 2 Environmental Statement

The Supplementary Environmental Statement (SES) and Additional Provision 2 Environmental Statement (AP2 ES) comprises:

- non-technical summary (NTS). This provides a summary in non-technical language of the SES (Part 1) and AP2 ES (Part 2) and of any likely significant environmental effects, both beneficial and adverse, which are new or different to those reported in the High Speed Two (HS2) Phase One Environmental Statement (ES) submitted to Parliament in November 2013 in support of the hybrid Bill ('the Bill') for Phase One of HS2 (hereafter referred to as 'the main ES') and, where relevant, the AP ES submitted in September 2014 (hereafter referred to as 'the AP1 ES');
- Volume 1: introduction to the SES and AP2 ES. This introduces the supplementary environmental information included within the SES and amendments which have resulted in the need to amend the Bill within the AP2 ES. It also explains any changes to the scope, methodology, assumptions and limitations required for the environmental impact assessment;
- Volume 2: community forum area (CFA) reports and map books. These describe the supplementary environmental information included within the SES (Part 1), amendments within the AP2 ES (Part 2) and any new or different likely significant environmental effects arising from these changes in each CFA compared to those reported in the main ES and, where relevant, the AP1 ES. The main local alternatives that have been considered are described, where relevant;
- Volume 3: route-wide effects. This describes new or different likely significant route-wide effects arising from the supplementary environmental information included within the SES (Part 1) and amendments within the AP2 ES (Part 2) compared to those reported in the main ES and, where relevant, the AP1 ES;
- Volume 4: off-route effects. This describes new or different likely significant off-route effects arising from the amendments within the AP2 ES, such as the relocation of the Heathrow Express (HEX) depot to Langley in Slough, compared to those reported in the main ES and, where relevant, the AP1 ES;
- Volume 5: appendices and map books. This contains supporting environmental information and associated maps; and
- glossary of terms and list of abbreviations. This contains any new or different

SES and AP2 ES Volume 3 - Route-wide effects

terms and abbreviations used throughout the SES and AP2 ES compared to those included in the main ES and AP1 ES.

1 Introduction

1.1 Introduction to the SES and AP2 ES for High Speed Two Phase One

- 1.1.1 The hybrid Bill for High Speed Rail between London and the West Midlands ('the Bill') was submitted to Parliament together with an Environmental Statement (ES) in November 2013 ('the main ES'). If enacted by Parliament, the Bill will provide the powers to construct, operate and maintain Phase One of High Speed Two (HS2). This phase of HS2 will provide a new north-south railway between London, Birmingham and the West Midlands. Phase Two of HS2 will comprise new lines between the West Midlands, Leeds and Manchester, completing what is known as the 'Y network'. Phase Two is not the subject of this document.
- 1.1.2 Since the deposit of the Bill for Phase One of HS2, a number of amendments to the scheme were identified as a result of further discussions with landowners and occupiers (including through the Parliamentary petitioning process), design refinements, and the requirements of utility undertakers. These amendments were assessed and any new or different likely significant environmental effects were reported in the Additional Provision Environmental Statement ('the AP1 ES'), published in September 2014. The AP1 ES was deposited in Parliament at the same time as the Bill amendments.
- 1.1.3 Since deposit of AP1 in September 2014, the need for further design changes and amendments has arisen following on-going discussions with petitioners, key stakeholders, and as a result of design refinements. New environmental information has also become available. Any new or different significant environmental effects that are likely to result from these proposed changes, new environmental information and amendments are reported in the Supplementary Environmental Statement (SES) and the Additional Provision 2 Environmental Statement ('the AP2 ES'). The SES reports on further environmental information, changes to the scheme assumptions and changes relating the existing Bill powers and limits, whereas the AP2 ES reports on the likely significant environmental effects of the latest additional provisions to the Bill. The SES and the AP2 ES are therefore separate environmental statements, but have been produced as combined volumes.
- 1.1.4 Both the SES and the AP2 ES provide an update to the main ES and AP1 ES, they should be read in conjunction with them.

1.2 Terminology used to describe the scheme

- 1.2.1 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 SES and the AP2 ES:
- 'the original scheme' - the Bill scheme submitted to Parliament in November 2013, which was assessed in the main ES;
 - 'the AP1 revised scheme' - the original scheme as amended by the AP1 (i.e. the amendments assessed within the AP1 ES) submitted in September 2014;
 - 'the SES scheme' - the original scheme with the design changes described in

the SES that are within the existing powers of the Bill; and

- 'the AP2 revised scheme' - the original scheme as amended by the SES design changes and AP2 amendments.

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

- 'SES design changes' - changes to the scheme reported in the SES that do not require additional powers; and
- 'AP2 amendments' - changes to the scheme reported in the AP2 ES that require additional powers outside the existing the Bill and its limits.

1.3 Scope of this report

- 1.3.1 A formal scoping process has been undertaken for the SES design changes and AP2 amendments in order to determine whether there is potential for the change or amendment to give rise to new or different significant environmental effects compared with those reported in the main ES or in the AP1 ES. Where such potential effects have been identified, they are reported in Volume 2 of this AP2 ES, for the relevant CFAs.
- 1.3.2 Each SES change and AP2 amendment has also been considered to determine its potential to give rise to new or different significant route-wide environmental effects. Route-wide effects reported in this volume are those considered to be appropriately assessed at a geographical scale greater than that presented within Volume 2, CFA reports of the SES and AP2 ES.
- 1.3.3 The route-wide effects, depending on the type of change, are reported in the SES (Part 1) or AP2 ES (Part 2) of this document, which are in turn divided into environmental topics. The environmental topics are presented in the same order as reported in Volume 3 of the main ES and the AP1 ES.
- 1.3.4 Part 1 of this report describes any new or different likely significant route-wide effects as a result of the SES changes in comparison with the effects of the original scheme in the first instance and, separately, any relevant AP1 amendments.
- 1.3.5 Part 2 describes any new or different likely significant route-wide effects as a result of the AP2 amendments and any relevant cumulation with the impacts of the SES changes, in comparison with the effects of the original scheme in the first instance and, separately, any relevant AP1 amendments.
- 1.3.6 In instances in which there are not considered to be significant route-wide effects as a consequence of the SES changes or AP2 amendments, the environmental topic is introduced and reasons for these conclusions are presented.
- 1.3.7 For some environmental topics, since effects are localised in extent and no additional significant route-wide effects have been identified they have been scoped out of the route-wide assessment of effects. These environmental topics are: air quality; community; cultural heritage; land quality; and sound, noise and vibration.

- 1.3.8 The climate and waste and material resources assessments are reported in full at a route-wide level rather than within Volume 2, CFA reports of the SES and AP2 ES. This follows the approach taken in the main ES.
- 1.3.9 Route-wide effects potentially include those that occur where new works are introduced in the Chilterns Area of Outstanding Natural Beauty (AONB) and where there is potential for new in-combination effects, as reported for agriculture, forestry and soils, and ecology. These are reported in this document.
- 1.3.10 Given that the methodology for each environmental topic assesses effects in a different way appropriate to that environmental topic, the approach to route-wide effects varies between environmental topics. The extent and basis of the route-wide assessment presented in this report is therefore explained in each of the environmental topic sections. The Scope and Methodology Report (SMR) (Volume 5: CT-001-000/1 of the main ES) and the SMR Addendum (Volume 5: CT-001-000/2 of the main ES) should also be referred to.
- 1.3.11 The standard measures that will be used to mitigate likely significant adverse environmental effects during the construction and operation of the scheme are described in the main ES, Volume 1, Section 9 and the draft Code of Construction Practice (CoCP) submitted in support of the Bill. Implementation of these measures has been assumed in this SES and AP2 ES.
- 1.3.12 Following the approach taken in the main ES and AP1, committed developments are considered within the assessments but only referred to if there is the potential for new or different significant cumulative effects.

1.4 Structure of this report

1.4.1 The report is structured as follows:

- Section 1: Introduction;

Part 1: Supplementary Environmental Statement

- Section 2: The Chilterns Area of Outstanding Natural Beauty;
- Section 3: Agriculture, forestry and soils;
- Section 4: Climate;
- Section 5: Ecology;
- Section 6: Landscape and visual assessment;
- Section 7: Socio-economics;
- Section 8: Traffic and transport;
- Section 9: Waste and material resources;
- Section 10: Water resources and flood risk assessment; and
- Section 11: Phase One and Phase Two combined impacts.

Part 2: Additional Provision 2 Environmental Statement

- Sections 12-21: the environmental topics are listed as per Sections 2-11 in Part 1 of this report.

Part 1: Supplementary Environmental Statement

2 The Chilterns Area of Outstanding Natural Beauty

2.1 Introduction

2.1.1 Volume 3 of the main ES and AP1 ES included an assessment of effects on the special landscape qualities of the Chilterns AONB. The SES design changes have been reviewed to consider whether they give rise to new or different route-wide significant effects.

2.2 Changes to the assessment of effects

2.2.1 The assessment of effects set out in the Volume 3 of the main ES addresses the natural beauty and special landscape qualities of the Chilterns AONB as referenced in the Chilterns AONB Management Plan 2008 - 2013¹ in combination with the individual CFA reports of the main ES:

- Chalfonts and Amersham (Volume 2, CFA Report 8, Section 9 and Volume 5);
- Central Chilterns (Volume 2, CFA Report 9, Section 9 and Volume 5); and
- Dunsmore, Wendover and Halton (Volume 2, CFA Report 10, Section 9 and Volume 5).

2.2.2 Since the publication of the main ES, the Chilterns AONB Management Plan has been reviewed and republished to cover the period between 2014 and 2019². The special qualities of the landscape, as detailed in the Chilterns AONB Management Plan 2008 - 2013 are summarised in the main ES, Volume 3 and are largely replicated in the 2014-2019 management plan with some small changes in total areas of downland, woodland and registered commons.

2.2.3 There is one SES design change located within the Chilterns AONB: SES-010-001 Hunt's Green Farm sustainable placement area (removal of sustainable placement area (SPA) from Hunt's Green Farm within CFA10). The SES scheme includes earthworks that will be substantially smaller than the SPA proposed in the original scheme and in the same location. Temporary storage of materials during construction is still required at this location.

2.2.4 It is not considered that the SES design change is of sufficient scale to give rise to any new or different effects on the special landscape qualities of the AONB. It does not therefore change the landscape and visual impact assessment reported in Volume 2 of the main ES and is not considered to result in any change in the assessment of effects on the Chilterns AONB presented in Volume 3 of the main ES or AP1 ES.

¹ The Chilterns Conservation Board (2008), Management Plan 2008 - 2013: A Framework for Action.

² The Chilterns Conservation Board (2014), Management Plan 2014 -2019: A Framework for Action

3 Agriculture, forestry and soils

3.1 Introduction

- 3.1.1 Volume 3 of the main ES provided an assessment of the route-wide impacts and likely significant effects on agriculture, forestry and soils arising from the construction of the original scheme. Since it is considered that during operation there will be no effects that become significant through accumulation across the original scheme, operational effects are not considered further.
- 3.1.2 Volume 3 of the AP1 ES reported that any changes as a result of the amendments within AP1 were not sufficient in scale to result in any new or different significant route-wide effects.

3.2 Changes to the assessment of effects

- 3.2.1 The main ES reports that a total of approximately 4,800ha³ of agricultural land, including approximately 2,500ha of best and most versatile (BMV) agricultural land in Grade 2 and Subgrade 3a, will be required temporarily during construction of the original scheme.
- 3.2.2 Following construction, the land required temporarily will be primarily reinstated to its pre-existing agricultural condition by following good practice guidance on the sustainable use of soils, as set out in the draft CoCP (main ES, Volume 5: Appendix CT-003-000). This will assist in minimising soil degradation, such that soils will continue to provide a varied range of important services and functions such as food production, carbon storage and climate regulation, water storage and filtration, flood management and support for biodiversity. Following construction and restoration to agricultural land, the main ES reports that the area of land that will remain permanently removed from agricultural use in the original scheme is approximately 2,800ha, of which 1,500ha (or 54%) is BMV land in Grade 2 and Subgrade 3a, and 1,300ha (46%) in Subgrade 3b and Grade 4.
- 3.2.3 Construction of the SES scheme will require approximately 30ha less agricultural land than the original scheme, of which 2ha are BMV land (Grade 2 and Subgrade 3a), with the remaining 28ha being lower quality land in Subgrade 3b. This change is not sufficient in scale to result in any new or different significant route-wide effects or any change in the assessment of effects presented in Volume 3 of the main ES or the AP1 ES.
- 3.2.4 The SES design changes will require approximately 2ha less forestry land than the original scheme but this change is not sufficient in scale to result in any new or different significant route-wide effects on forestry land.

³³ Total land-take is rounded to the nearest 100ha

4 Climate

4.1 Introduction

- 4.1.1 Volume 3 of the main ES reported the assessment of the greenhouse gas (GHG) emissions of the original scheme during construction and operation.
- 4.1.2 Volume 3 of the AP1 ES reported that the potential impact of the AP1 amendments on the carbon footprint would be negligible and therefore did not warrant any further analysis.

4.2 Changes to the assessment of effects

- 4.2.1 A scoping assessment was undertaken to determine if the SES design changes would be likely to result in material difference to the GHG emissions of the original scheme.
- 4.2.2 The outcomes of this scoping assessment identified that the impact of the SES design changes on the overall carbon footprint presented in Volume 3 of the main ES and AP1 would be negligible and therefore do not warrant any further analysis⁴.
- 4.2.3 For further detail on the scoping methodology applied see Part 2, Section 14.2 of this document and Annex CL-002-000 (Volume 5) for the scoping outcomes.

⁴ Updates to the carbon footprint relating to other changes in construction and operation effects as a result of the removal of the HS1-HS2 link will be fully reported in a future ES.

5 Ecology

5.1 Introduction

- 5.1.1 This section of the report identifies any new or different significant effects on ecological resources to those reported in Volume 3 of the main ES due to updates to baseline and SES design changes. It then separately considers the SES scheme with any relevant AP1 amendments to identify the potential for any additional cumulative effects at the route-wide level. Consideration is given to the potential for impacts on species, habitats and sites designated on the basis of their importance for nature conservation.
- 5.1.2 Volume 3 of the main ES described the likely significant effects on ecological resources that will occur on a route-wide level as a consequence of the construction and operation of the original scheme. The route-wide assessment addressed significant effects at the regional and national level, and in-combination effects not discussed within Volume 2 of the main ES.
- 5.1.3 Volume 3 of the AP1 ES reported that the AP1 amendments lead to only minor changes in the ecological effects reported in the main ES. These changes were not sufficient to generate new or different significant effects at a route-wide level for ecology.
- 5.1.4 Local/parish level effects on ecological receptors are listed in Volume 5 Appendix EC-005-001, EC-005-002, EC-005-003 and EC-005-004 of the main ES and within SES and AP2 ES Volume 5 Appendix: EC-003-001, EC-003-002, EC-003-003 and, EC-003-004.

5.2 Changes to the assessment of effects

Designated sites

- 5.2.1 The SES changes will not result in any new or different likely significant effects on statutory designated sites.
- 5.2.2 The main ES identified that the original scheme would result in habitat loss and/or fragmentation of 89 non-statutory local wildlife sites (LWS). At 61 of these LWS, the impacts of the original scheme were identified as resulting in a likely significant adverse effect on the integrity of the site.
- 5.2.3 Since publication of the main ES, a new LWS (Coleshill Sludge Lagoons LWS) that lies within the land required for the construction and operation of the SES scheme has been designated. The SES scheme will therefore result in habitat loss and/or fragmentation of 90 LWS. The newly designated LWS is located within Warwickshire and increases the total number of LWS within Warwickshire affected by the scheme to 19 (approximately 4.5% of the total in Warwickshire).
- 5.2.4 In addition, the boundary of the Snake's Hill and River Oxbow, Black Brook Site of Biological Importance (SBI) has been extended since publication of the main ES. Details of the significant adverse effects on these individual sites are provided in Part 1 of the relevant SES and AP2 ES Volume 2, CFA reports.
- 5.2.5 The main ES reported that prior to mitigation there is the potential for the adverse effects on the LWS identified in the Volume 2 CFA reports to result in additional

significant adverse effects on the networks of which they form a part. The designation of the Coleshil Sludge Lagoons LWS and the extension of the Snake's Hill and River Oxbow, Black Brook SBI will prior to mitigation result in a different adverse effect on the ecological networks of which the LWS forms a part. However, following the implementation of proposed mitigation and compensation, the route-wide effects on ecological networks will be reduced to a level where they are not likely to be significant.

Habitats

- 5.2.6 Volume 3 of the main ES reports that the original scheme would result in losses of 32ha of ancient woodland. This was identified as a permanent adverse residual effect on an irreplaceable resource, which is significant at the national level. These losses were reported in Volume 3 of the main ES as involving a total of 19 woodlands. However, this figure considered ancient woodlands located in close proximity as a single ancient woodland area. It is therefore accepted that the original scheme would adversely affect a total of 22 ancient woodlands, some of which are adjacent to each other or located in very close proximity. Effects on all 22 ancient woodlands were reported in the relevant main ES Volume 2 CFA reports. This correction does not alter the permanent adverse residual effect on an irreplaceable resource reported in the main ES which is significant at the national level.
- 5.2.7 Since publication of the main ES a total of four additional woodland areas located within the land required for the construction of the original scheme have been formally added to the ancient woodland inventory. These are the land opposite Decoypond Wood (CFA13), two unnamed woodlands to the south of Calvert (both in CFA13) and Mossycorner Spinney (CFA14). In addition the extent of the area included on the ancient woodland inventory at Ranston Covert and Battlesford Wood (CFA7) has been increased, and now includes more of the woodland within the land required for the original scheme. The SES includes an assurance that no works will be undertaken within the small area of ancient woodland at Ranston Covert (CFA7) (approximately 25m²) which is now located within the land required for the original scheme.
- 5.2.8 A further 11 woodland sites⁵ that would be subject to habitat loss and/or fragmentation under the original scheme have been identified since the main ES as likely to be added to the ancient woodland inventory. For the purposes of this assessment all such woodland have been considered as ancient woodland. These are: Fox Covert (Glyn Davies Wood) (CFA15), Burnt Firs (CFA17), Black Waste Wood, Little Pools Wood, Birches Wood and an unnamed woodland south of the B4115 near Stoneleigh (all CFA18); Walker's Spinney (CFA20); Fulfen Wood, Little Lyntus (both CFA22); Parkhill Wood (CFA25); and Langley Woods (CFA25). Newyear's Green Covert (CFA6) is likely to be ancient and is in part located within the land required for the scheme. However, the ancient woodland at Newyear's Green Covert will be retained and no works will be undertaken within these areas.
- 5.2.9 The SES changes do not alter the overall area of woodland habitat lost as a consequence of the scheme. However, the changes in status of some woodlands means that ancient woodland losses as a consequence of the SES scheme would

⁵Newyear's Green Covert is also likely to be ancient and is located within the land required for the scheme. However, as detailed within the main ES, no works within Newyear's Green Covert will be undertaken.

increase by approximately 12.5ha from those reported in the main ES, resulting in ancient woodland losses of approximately 44.5ha which result in habitat loss or fragmentation from a total of 37 sites. The ancient woodland losses that will occur due to the changes in status since the main ES will result in a different permanent adverse residual effect on an irreplaceable resource that will be significant at the national level. This level of significance is unchanged from that reported in the main ES.

- 5.2.10 Additional mitigation and compensation is required in response to the updated baseline information relating to ancient woodland. Appropriate measures are expected to be brought forward either through direct agreement with landowners or through future additional provisions to the Bill, as stated within the relevant SES and AP2 ES Volume 2 CFA reports.

Protected and/or notable species

- 5.2.11 The main ES reported that prior to mitigation there was the potential for an adverse effect on Natterer's bat at Radstone (CFA14) which would be significant at regional level. Further monitoring of the Natterer's bat population at Radstone since submission of the main ES, has identified that a larger proportion of the population than previously expected utilise the route of the Helmdon Disused Railway Site of Special Scientific Interest (SSSI) (CFA14). Therefore, there is an increased risk of bats colliding with passing trains during operation of the scheme. The mitigation measures included within the original scheme are unlikely to be sufficient to prevent a residual adverse effect on the conservation status of the Natterer's bat population concerned, and thus there would be a significant adverse effect at the regional level. There is thus a requirement for additional mitigation and appropriate measures are being brought forward through an AP2 amendment (AP2-014-006). A full description of the measures proposed, and the reporting of the revised effects taking the proposed measures into account is provided in Part 2, Section 15 of this document.
- 5.2.12 A population of Bechstein's bat comprised of at least three colonies is associated with a network of woodlands located either side of the scheme in the Waddesdon and Quainton (CFA12) and Calvert, Steeple Claydon, Twyford and Chetwode (CFA13) areas. These woodlands collectively form remnants of the former Bernwood Forest. The main ES reported that prior to mitigation the original scheme could result in adverse effects on the conservation status of Bechstein's bat and other *Myotis* species during construction due to habitat loss and severance, and during operation due to collisions with passing trains. In each case prior to mitigation these effects were identified in the main ES as significant at the national level.
- 5.2.13 Additional survey work undertaken since the production of the main ES, has confirmed that populations of Bechstein's bat, and other woodland bats in CFA12 and CFA13 are using the same key crossing points along the scheme identified in the main ES. This data has also identified an increased risk of adverse effects on bats in several locations during operation of the scheme. This has led to the incorporation of the following additional mitigation measures within the SES scheme:
- a 50m extension of the Sheephouse Wood mitigation structure in order to provide a physical barrier between trains and any bats passing above the CAG/2 underbridge;
 - provision of additional planting parallel to, but set back from, the HS2 route

between Edgcott Road overbridge and the River Ray, to provide an alternative bat flightline; and

- provision of appropriate measures to avoid light spillage into the Mega Ditch⁶ that would have the potential to result in disturbance of bat populations using this important bat flightline.

5.2.14 Following the implementation of these measures the adverse effects on bat populations in the former Bernwood Forest area, including Bechstein's bat, will be reduced to a level where there will not be significant adverse effects on the conservation status of the populations concerned.

5.2.15 No other new baseline information or SES changes are expected to result in new or different likely significant effects at the route-wide level.

Management and monitoring

5.2.16 The Environmental Minimum Requirements for HS2 Phase One include a commitment to maintain and monitor created habitats for an appropriate period to establish those habitats. Since the publication of the main ES, HS2 has published an information paper⁷ that outlines indicative periods for the management and monitoring of habitats created for HS2 Phase One. Appropriate management and monitoring will be provided to ensure that habitats establish and achieve their agreed objectives.

5.2.17 The duration and frequency of management and monitoring specifically relating to protected and/or notable species will be appropriate to both fulfil licensing requirements, and ensure that proposed measures have achieved their set objectives.

Cumulative effects

5.2.18 Volume 3 of the AP1 ES reported that the amendments within AP1 would not generate new or different significant effects at a route-wide level for ecology.

5.2.19 No new or different likely significant effects relevant at a route-wide level are expected as a consequence of the new baseline and SES design changes occurring in combination with AP1 amendments.

⁶ Deepened and widened diversion of the Muxwell Brook close to Sheephouse Wood and adjacent to parts of the Bridleway GUN/25, containing scattered scrub and wetland vegetation

⁷ HS2 (2015) HS2 Information Paper: E26 Indicative periods for the management and monitoring of habitats created for HS2 Phase One. Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403455/E26_-_Indicative_Periods_for_the_Management_and_Monitoring_of_Habitats_v1.0.docx.pdf Accessed 07th June 2015.

6 Landscape and visual assessment

6.1 Introduction

- 6.1.1 Volume 3 of the main ES reported no significant route-wide effects on landscape and visual receptors arising from the construction or operation of the original scheme. Due to its importance, the effects on the Chilterns AONB were assessed in their own right and reported in Section 2 of Volume 3 of the main ES (and Section 2 of this report).
- 6.1.2 Volume 3 of the AP1 ES reported that the AP1 amendments would not generate new or different significant effects at a route-wide level for landscape and visual assessment.

6.2 Changes to the assessment of effects

- 6.2.1 The changes as a result of the SES scheme are not considered to result in any new or different significant route-wide effects from those presented in Volume 3 of the main ES or AP1 ES.

7 Socio-economics

7.1 Introduction

7.1.1 Direct and indirect socio-economic effects of the original scheme were reported in the main ES at a route-wide and CFA level. The assessment in Volume 3 of the main ES considered:

- route-wide construction employment created (direct and indirect);
- employment in businesses directly and indirectly affected by construction;
- operational employment; and
- operational effects on existing business employment.

7.1.2 Volume 3 of the AP1 ES reported that the AP1 amendments would not generate new or different significant effects at a route-wide level for socio-economics.

7.2 Changes to the assessment of effects

7.2.1 The changes as a result of the SES scheme are not considered to result in any new or different significant route-wide effects from those presented in Volume 3 of the main ES or AP1 ES.

8 Traffic and transport

8.1 Introduction

- 8.1.1 Volume 3 of the main ES provided an overview of the approach to and conclusions from the route-wide traffic and transport assessment of the original scheme. It considered the impacts that may occur over a wide area due to changes in travel patterns.
- 8.1.2 Volume 3 of the AP1 ES reported that the AP1 amendments would not generate new or different significant effects at a route-wide level for traffic and transport.

8.2 Changes to the assessment of effects

- 8.2.1 There are a number of corrections to the route-wide assessment reported in the main ES. These SES corrections relate to the forecast changes in the off-route station passenger flows.
- 8.2.2 Table 1 provides a list of those instances where data was factually incorrect or the corrections have the potential to alter the significance of environmental effects reported in the main ES. It gives the location of the inaccuracy in the main ES, a description of the correction, replicates the text from the main ES and where applicable, provides revised text.

Table 1: Summary of route-wide corrections to the main ES

| Reference in the main ES | Reason for correction | Text in the main ES | Revised text | Change to route-wide significant effects and mitigation |
|-----------------------------------|---|--|--|---|
| Volume 3, Section 13 Table 14. | Incorrect reporting of % changes in numbers of passengers arriving/ departing at stations | Northampton station: 10% in 2026, 10% in 2036 | Northampton station: 11% in 2026, 12% in 2036 | No. No mitigation required. |
| | | Leamington Spa station: 14% in 2026, 11% in 2036 | Leamington Spa station: 7% in 2026, 8% in 2036 | No. No mitigation required. |
| | | Worcester Shrub Hill station: 14% in 2026, 14% in 2036 | Worcester Shrub Hill station: 6% in 2026, 6% in 2036 | No. No mitigation required. |
| | | Wellingborough station: 7% in 2026, 7% in 2036 | Wellingborough station: 9% in 2026, 12% in 2036 | No. No mitigation required. |
| | | Cheltenham Spa station: 8% in 2026, 7% in 2036 | Cheltenham Spa station: no longer included as below the threshold reported | No. No mitigation required. |

- 8.2.3 The corrections result in minor local changes, which are negligible at a route-wide level. These corrections do not result in any new or different significant route-wide

SES and AP2 ES Volume 3 - Route-wide effects

effects or any changes to the assessment of effects presented in Volume 3 of the main ES.

9 Waste and material resources

9.1 Introduction

- 9.1.1 Volume 3 of the main ES presented a route-wide assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste that would be generated by the construction and operation of the original scheme.
- 9.1.2 The waste and material resources topic was scoped out of Volume 3 of the AP1 ES as it was assessed that the AP1 amendments would not give rise to issues that would be material to the consideration of new or different significant environmental route-wide effects.

9.2 Changes to the assessment of effects

- 9.2.1 The one SES design change that is considered relevant to the assessment of the likely significant environmental route-wide effects associated with waste and material resources relates to the removal of the proposed SPA near Hunt's Green Farm (SPA2) in CFA10. This SPA was planned for the on-site placement for disposal of approximately 1,928,002 tonnes of surplus excavated material but is no longer required.
- 9.2.2 The removal of the SPA in addition to the other SES design changes will not result in new or different likely significant environmental route-wide effects with regard to waste and material resources⁸.

⁸ The removal of the HS1-HS2 link is included in the forecast balance of excavated material quantities. Updates to the waste and material resources topic relating to operational waste as a result of the removal of the HS1-HS2 link will be reported in a future ES.

10 Water resources and flood risk assessment

10.1 Introduction

- 10.1.1 Volume 3 of the main ES presented the significant route-wide effects on surface water and groundwater resources and flood risk. It concluded that, with the exception of the Mid-Chilterns Chalk groundwater body, there are no likely significant regional or route-wide temporary or permanent adverse effects on water resources and flood risk as a result of the construction process or the operation and maintenance of the original scheme.
- 10.1.2 The water resources and flood risk topic was scoped out of Volume 3 of the AP1 ES as the AP1 amendments were not considered likely to generate new or different significant environmental route-wide effects with regard to water resources and flood risk.
- 10.1.3 Volume 3 of the main ES also included a route-wide Water Framework Directive (WFD) compliance assessment for the 75 water bodies (60 surface water bodies and 15 groundwater bodies) potentially affected by the original scheme. The compliance assessment determined whether any of the scheme elements would result in a breach of WFD objectives, the two objectives being:
- ensuring a scheme element does not result in deterioration in the current WFD status or potential for any water body; and
 - ensuring a scheme element does not prevent a failing water body from attainment of good WFD status or potential in the future.
- 10.1.4 The WFD compliance assessment showed that 24 water bodies were considered to be at amber risk (adverse widespread or prolonged potential effect) of resulting in a breach of WFD objectives. Of the 24 water bodies, potential but low risks of WFD breach were identified for 11 surface water bodies and eight groundwater bodies. Higher risks were identified for four surface water bodies and one groundwater body. For all of these it was considered that avoidance measures and generic mitigation measures would lead to there being no breach of WFD objectives. The remaining 45 surface water bodies and six groundwater bodies were assessed as yellow (localised or temporary adverse potential effect) or green risk (no adverse effect) and were not therefore identified as being at risk of breaching WFD objectives. The assessment was based on a precautionary approach.
- 10.1.5 Where the available baseline data was limited and a potential risk was identified, further WFD surveys were undertaken for those waterbodies during 2014 and any change to the assessment baseline for the original scheme has been assessed and reported within this section.
- 10.1.6 A scoping exercise was undertaken to determine whether any of the SES design changes would act in combination to lead to regional or route-wide effects on water resources or flood risk. This scoping exercise determined that the SES design changes were not material and did not have the potential to give rise to new or different route-

wide significant effects. The focus of the SES assessment has therefore been on changes to the baseline following additional surveys undertaken for WFD in 2014.

10.2 Changes to the assessment of effects

10.2.1 WFD surveys (hydromorphological and ecological walk-over, groundwater, macrophyte, macro-invertebrate and fish) have been undertaken since submission of the main ES. A summary of the survey work undertaken since September 2013 and a WFD reassessment of the SES scheme are provided in Volume 5: Appendix WR-001-000 Annex A Surface Water and Annex B Groundwater and Volume 5 map series WR-03.

Change in potential risks to water body status

Surface water

10.2.2 In the main ES, 15 surface water bodies were considered to be at amber risk of deterioration as a result of effects on one or more of the quality elements. Reassessment using the new WFD survey resulted in six of the 15 amber risk surface water bodies having a reduced risk of deterioration, to yellow risk, taking into account the additional baseline information.

10.2.3 Surface water bodies considered to be at reduced (amber to yellow) risk, include the:

- River Itchen (source to confluence with River Stowe);
- River Cherwell (Ashby Brook to Cropredy);
- Fleet Marston Brook;
- Tetchwick Brook;
- River Colne and Grand Union Canal (GUC) (from confluence with Chess to Ash); and
- the Twin.

10.2.4 The amber risk of deterioration for the other nine water bodies remains unchanged.

10.2.5 On the basis of the new WFD survey information, the assessment concluded that whilst there might be some different levels of effects as a result of the new baseline, these new effects are not of a sufficient level to be classed as significant.

Groundwater

10.2.6 On the basis of the new WFD survey information, the assessment concluded that there would be no change to the conclusion of the main ES.

WFD compliance

10.2.7 As for the main ES, the WFD reassessment has been undertaken on a precautionary basis given that baseline data was not available for all the affected water bodies and tributaries, and that the detailed design of mitigation measures has yet to be undertaken.

10.2.8 The WFD assessment provides an indication of the likely compliance of the SES scheme at the time the assessment was prepared. The assessment assumes key

avoidance and mitigation measures as presented in the main ES are in place such as, ensuring that engineering design retains an adequate 'buffer' around sites, habitats or features of ecological value, sufficient to ensure their continued ecological functionality (see section 2.5 of Appendix RW-001-000 of the main ES for a full list).

- 10.2.9 Taking into account the avoidance and mitigation measures, the assessment concluded that, as for the original scheme, there will be no breach of the WFD.

11 Phase One and Phase Two combined impacts

11.1 Introduction

11.1.1 Volume 3 of the main ES presented a tabulated summary of the potential total impacts of both Phase One (the original scheme) and Phase Two on a range of environmental receptors. Phase Two of HS2 will comprise new lines between the West Midlands, Leeds and Manchester, completing what is known as the 'Y network'. Impacts of the original scheme were based on design data and assessments undertaken as part of the Environmental Impact Assessment (EIA) or assessments prepared in support of the January 2012 updated Appraisal of Sustainability report for Phase One. The Phase Two data was taken from the Phase Two Sustainability Statement, published in July 2013.

11.1.2 Volume 3 of the AP1 ES reported that the amendments would result in very minor or negligible changes to the figures given in the main ES and would not result in any material difference in the information provided in the main ES in relation to Phase one and Phase Two combined impacts.

11.2 Summary of changes to combined impacts

11.2.1 The SES design changes will result in very minor or negligible changes to the figures given in Volume 3 of the main ES. These changes do not result in any material difference in the information provided in the main ES or AP1 in relation to Phase One and Phase Two combined impacts.

Part 2: Additional Provision 2 Environmental Statement

12 The Chilterns Area of Outstanding Natural Beauty

12.1 Introduction

12.1.1 The assessment of effects set out in the Volume 3 of the main ES addresses the natural beauty and special landscape qualities of the Chilterns AONB, as referenced in the Chilterns AONB Management Plan 2008 - 2013, in combination with the individual CFA reports in the main ES:

- Chalfonts and Amersham (Volume 2, CFA report 8, Section 9 and Volume 5);
- Central Chilterns (Volume 2, CFA report 9, Section 9 and Volume 5); and
- Dunsmore, Wendover and Halton (Volume 2, CFA report 10, Section 9 and Volume 5).

12.1.2 Since the publication of the main ES, the Chilterns AONB Management Plan has been reviewed and republished to cover the period between 2014 and 2019. The special qualities of the landscape, as detailed in the Chilterns AONB Management Plan 2008 - 2013 are summarised in the main ES, Volume 3 and are largely replicated in the 2014-2019 management plan with some small changes in total areas of downland, woodland and registered commons.

12.1.3 Volume 3 of the AP1 ES reported that the amendments within AP1 were not of sufficient scale to give rise to any new or different likely significant environmental effects on the special landscape qualities of the AONB and were therefore not considered to result in any change in the assessment of effects on the Chilterns AONB presented in Volume 3 of the main ES.

12.1.4 Section 2 of this volume reports that the SES design changes are not of sufficient scale to give rise to any new or different likely significant environmental effects on the special landscape qualities of the AONB and are therefore not considered to result in any changes in the assessment of effects on the Chilterns AONB presented in Volume 3 of the main ES.

12.2 Changes to the assessment of effects

12.2.1 There are six amendments located within the Chilterns AONB which require an amendment to Bill powers:

- AP2-009-001, change to land required in Mantle's Wood for the Chiltern Tunnel north portal (overall reduction in land required within Mantle's Wood compared to main ES);
- AP2-009-002, realignment of Footpaths LMI/21 and GMI/23 (permanently diverted to an existing track through Mantle's Wood);

SES and AP2 ES Volume 3 - Route-wide effects

- AP2-009-003, additional land required for an access track to drainage infrastructure from the A413 Aylesbury Road;
- AP2-010-001, additional land required for construction access and material stockpile at Jones' Hill Wood;
- AP2-010-002, additional land required for access to a balancing pond at Wendover Dean; and
- AP2-010-003, minor highway improvements at the existing access track at Durham Farm, Wendover Dean.

12.2.2 Most of the amendments are minor in nature. AP2-009-001, change to land required in Mantle's Wood for the Chiltern Tunnel north portal, represents an overall reduction in the land required within Mantle's Wood compared to main ES but with a six months longer construction period.

12.2.3 It is not considered that the amendments are of sufficient scale to give rise to any new or different effects on the special landscape qualities of the AONB. They do not change the landscape and visual impact assessment reported in Volume 2 of the main ES and are not considered to result in any change in the assessment of effects on the Chilterns AONB from the original scheme, AP1 revised scheme or SES scheme.

13 Agriculture, forestry and soils

13.1 Introduction

- 13.1.1 Volume 3 of the main ES provided an assessment of the route-wide impacts and likely significant effects on agriculture, forestry and soils arising from the construction of the original scheme. Since it is considered that during operation there will be no effects that become significant through accumulation across the original scheme, operational effects are not considered further.
- 13.1.2 Volume 3 of the AP1 ES reported that any changes as a result of the amendments within AP1 were not sufficient in scale to result in any new or different significant route-wide effects.
- 13.1.3 Section 3 of this volume reports that the changes as a result of the SES design changes are not sufficient in scale to result in any new or different significant route-wide effects.

13.2 Changes to the assessment of effects

- 13.2.1 The main ES reported that a total of approximately 4,800ha of agricultural land, including approximately 2,500ha of BMV agricultural land in Grade 2 and Subgrade 3a, will be required temporarily for the construction of the original scheme. Construction of the AP1 revised scheme will require approximately 50ha of additional agricultural land temporarily during construction. The construction of the SES scheme will require the temporary use of approximately 30ha less agricultural land than the original scheme. The AP2 revised scheme will require approximately 40ha less agricultural land temporarily during construction than the original scheme (and 10ha less than the SES scheme) virtually all of which is BMV land (Grade 2 and Subgrade 3a).
- 13.2.2 Following construction, the land required temporarily will be primarily reinstated to its pre-existing agricultural condition, and the area of land that will change permanently from agricultural use in the AP2 revised scheme will increase by 80ha to approximately 2,900ha⁹, of which approximately 1,500ha is BMV land in Grade 2 and Subgrade 3a, and 1,400ha is in Subgrade 3b and Grade 4.
- 13.2.3 These changes are not sufficient in scale to result in any new or different significant route-wide effects temporarily or permanently from the original scheme, AP1 revised scheme or SES scheme.
- 13.2.4 Approximately 10ha of additional forestry land will be required by the AP2 revised scheme compared to the original scheme but an equivalent area will be planted within the AP2 revised scheme, such that these changes will not result in a new or different significant route-wide effect on forestry land.

⁹ Total land-take is rounded to the nearest 100ha

14 Climate

14.1 Introduction

- 14.1.1 Volume 3 of the main ES reported the assessment of the GHG emissions of the original scheme during construction and operation.
- 14.1.2 Volume 3 of the AP1 ES reported that the potential impact of the AP1 amendments on the carbon footprint would be negligible and therefore did not warrant any further analysis.
- 14.1.3 Part 2, Section 4 of this volume reports that the impact of the SES design changes on the overall carbon footprint would be negligible and therefore do not warrant any further analysis.

14.2 Scope, assumptions and limitations

- 14.2.1 A scoping exercise identified nine AP2 amendments with the potential to materially impact the original scheme's carbon footprint. This section reports the impact of these amendments on the route-wide GHG assessment.
- 14.2.2 The GHG scoping exercise identified which of the AP2 amendments are considered to be potentially material from a GHG emissions perspective.
- 14.2.3 The methodology for determining which design amendments are material in terms of GHG emissions comprises quantitative and qualitative assessments. See Volume 5, Annex CL-002-000 for a more detailed description of the relevant criteria.
- 14.2.4 AP2 amendments were reviewed both individually and as a group using these criteria. The potential GHG emissions impact of the AP2 amendments has been considered in the context of the GHG emissions of the original scheme to determine whether the change is considered to be potentially material or not.
- 14.2.5 The nine AP2 amendments with the potential to materially impact the original scheme's carbon footprint relate to construction, and are listed below:
- AP2-004-005: additional land required for the construction of a temporary logistics tunnel (Atlas Road to Old Oak Common Box Temporary Logistics Tunnel);
 - AP2-009-001: additional land required in Mantle's Wood for the Chiltern tunnel north portal tunnel;
 - AP2-022-001: alignment change and associated amendments in the Lichfield area;
 - AP2-020-005: reduction in the width of the North Wood landscape earthworks;
 - AP2-022-001: alignment change to pass under the West Coast Main Line, South Staffordshire and A38, and associated amendments;
 - AP2-021-001: lowering of the alignment of the HS2 route to the west of Drayton ;
 - AP2-018-004: Burton Green tunnel revised length and vertical alignment;

- AP2-020-007: lowering of the alignment of the HS2 route northwards of Middleton; and
- AP2-023-004: extension of the River Blythe viaduct.

14.2.6 Accordingly, the carbon footprint of these amendments has been calculated. Any consequential impacts that the AP2 amendments may have on HS2's operational GHG emissions are considered to be negligible.

14.3 Carbon footprint methodology

14.3.1 The methodology used to assess GHG emissions remains unchanged and has been applied to each of the identified amendments.

14.3.2 No changes have been made to the underlying assumptions of the carbon footprint methodology e.g. carbon factors adopted, the density and weight of construction material, or transport vehicles assumed for logistics. See Section 4 of Appendix CL-002-000 (Volume 5).

14.4 GHG implications of AP2 amendments

14.4.1 Construction GHG emissions in the main ES were reported at 5,590,000 tCO₂e under the central scenario (Scenario A)¹⁰, and 5,300,000 tCO₂e under a stretch scenario (Scenario B)¹¹.

14.4.2 The potentially material AP2 amendments have been calculated to increase construction GHG emissions by 210,000 tCO₂e (Scenario A) and 190,000 tCO₂e (Scenario B), equivalent to a 3.6 and 3.5% increase, respectively.

14.4.3 Table 2 summarises the change in GHG emissions as a result of the AP2 amendments considered to be potentially material.

Table 2: HS2 construction emissions (tCO₂e) comparison between the original scheme and the AP2 revised scheme

| | Scenario A | Scenario B |
|---------------------------------|------------|------------|
| Original scheme | 5,590,000 | 5,300,000 |
| AP2 revised scheme | 5,800,000 | 5,490,000 |
| Difference (tCO ₂ e) | + 210,000 | + 190,000 |
| Difference (%) | 3.6% | 3.5% |

14.5 Conclusions

14.5.1 The impact of the AP2 amendments is minor, with construction GHG emissions increasing by 3.5 and 3.6% respectively for each scenario.

¹⁰ Scenario A represents the 'central' scenario where anticipated carbon reduction targets of concrete and steel are likely to be achieved in time for the construction of HS2.

¹¹ Scenario B represents the 'stretch' scenario where concrete and steel carbon factors are derived from anticipated carbon reduction trajectories in line with the UK's 2050 carbon reduction target.

SES and AP2 ES Volume 3 - Route-wide effects

- 14.5.2 A significant proportion of the construction footprint is associated with viaducts, bridges, tunnel, some of which help to mitigate other significant environmental impacts, such as noise and visual amenity.
- 14.5.3 The overall conclusions from this assessment remain the same as in Volume 3 in the main ES.
- 14.5.4 The AP2 amendments are considered to have a negligible effects on the operation of the scheme and therefore the GHG benefits associated with the AP2 revised scheme's operation remain as reported in the main ES¹².

¹² Updates to the carbon footprint relating to other changes in construction and operation effects as a result of the removal of the HS1-HS2 link will be fully reported in a future ES.

15 Ecology

15.1 Introduction

- 15.1.1 This section of the report identifies any new or different significant effects on ecological resources to those reported in Volume 3 of the main ES due to the proposed AP2 amendments. It then separately considers the AP2 revised scheme with any relevant AP1 amendments to identify the potential for any additional cumulative effects at the route-wide level. Consideration is given to the potential for impacts on species, habitats and sites designated on the basis of their importance for nature conservation.
- 15.1.2 Volume 3 of the main ES described the likely significant effects on ecological resources that will occur on a route-wide level as a consequence of the construction and operation of the original scheme. The route-wide assessment addressed significant effects at the regional and national level, and in-combination effects not discussed within Volume 2 of the main ES.
- 15.1.3 Volume 3 of the AP1 ES reported that the amendments within AP1 would not generate new or different significant effects at a route-wide level for ecology.
- 15.1.4 Where relevant, the new or different significant effects on ecological receptors relevant at the route-wide level that are reported in the SES (see Part 1, Section 5 of this document) are taken into consideration within the assessment of the proposed AP2 amendments.
- 15.1.5 Local/parish level effects on ecological receptors are listed within Volume 5 Appendix EC-005-001, EC-005-002, EC-005-003 and EC-005-004 of the main ES and within SES and AP2 ES Volume 5 Appendix EC-003-001, EC-003-002, EC-003-003 and, EC-003-004.

15.2 Changes to the assessment of effects

Designated sites

- 15.2.1 Volume 3 of the main ES identified an adverse effect on the Helmdon Disused Railway SSSI (CFA14) that will be significant at the national level. AP2-014-006 will result in the loss of an additional 1.4ha (0.8ha of the SSSI was required in the original scheme) of habitat from the Helmdon Disused Railway SSSI, including 0.6ha of calcareous grassland for which the site is designated. The amendment is required in order to provide a green bridge that will facilitate the safe passage of bats, in particular Natterer's bat, across the railway. In parallel, the compensation for the loss and severance of the SSSI has been revised. The revised mitigation and compensation for impacts on the SSSI is described in the SES and AP2 ES Volume 2, CFA Report 14, Newton Purcell to Brackley (CFA14).
- 15.2.2 Prior to mitigation and compensation, the proposed amendment would result in a different significant effect on the SSSI. However, once constructed and established, the green bridge will remove the regional level likely residual significant effect on the Natterer's bat population at Radstone that is reported in the SES (SES and AP2 ES Volume 2, Part 2 CFA14). In addition, the effects of habitat loss and fragmentation on

Helmdon Disused Railway SSSI will be addressed, and there will be no significant residual effect. This is unchanged from the outcome reported in the main ES.

- 15.2.3 Based on a precautionary assessment, there is the potential that the AP2 revised scheme may lead to adverse effects on a single additional LWS, Moor Covert and Pool SBI (see SES and AP2 ES Volume 2, CFA21 AP-021-004). The AP2 revised scheme will therefore potentially result in habitat loss and/or fragmentation of 91 LWS. The additional site is within Staffordshire, and increases the number of affected LWS within Staffordshire to 18 (approximately 2% of the total in Staffordshire). This represents a different significant adverse effect on the ecological networks of which the LWS forms a part. However, even in the absence of committed mitigation specific to Moor Covert and Pool SBI, the route-wide effects on ecological networks are not likely to be significant.

Habitats

- 15.2.4 The SES reports a loss of approximately 44.5ha of ancient woodland, with a total of 37 ancient (or likely ancient) woodlands directly affected. This was identified as a permanent adverse residual effect on an irreplaceable resource, which is significant at the national level.
- 15.2.5 The AP2 amendments incorporate design changes at several sites in order to reduce the areas of ancient woodland required for the construction of the scheme. In addition the movement of the alignment in CFA22 Whittington to Handsacre results in a change to the impact on ancient woodlands in that area of the route. The AP2 revised scheme will not result in loss of ancient woodland at the Slaish (affected under the original scheme) and there will be reductions in ancient woodland losses at six other sites, namely Mantle's Wood (CFA9), Jones's Hill Wood (CFA10); Mossycorner Spinney (CFA14); Fox Covert (Glyn Davies Wood) (CFA15); North Wood (CFA20) and Rookery SBI (CFA20). The AP2 amendments will result in habitat loss from one additional ancient woodland that would not be subject to impacts under the SES scheme, namely Big Lyntus (0.9ha) (CFA22). Therefore, overall there will be no change in the total number of 37 ancient woodlands that will be directly affected by the AP2 revised scheme, and the total ancient woodland losses as a consequence of the AP2 revised scheme will be reduced to approximately 43.8ha (compared to 44.5ha for the SES scheme). This is a different significant effect to that reported in the SES; however it remains a permanent adverse residual effect on an irreplaceable resource, which is significant at the national level.
- 15.2.6 Additional mitigation and compensation is required in response to the amended status of ancient woodland areas detailed in the SES. AP2-014-003 provides approximately an additional 2.9ha of broadleaved woodland planting as compensation for loss of ancient woodland at Mossycorner Spinney. In addition the changes in the Whittington to Handsacre (CFA22) area will result in an approximately 10ha increase in the extent of ecological compensation for woodland and associated habitats. Further mitigation and compensation for losses to ancient woodland sites are expected to be brought forward either through direct agreement with landowners or through future additional provisions to the Bill.
- 15.2.7 The AP2 amendments will result in the following changes to the extent of the most notable habitat losses that are described in the main ES:

- broadleaved woodland: a net reduction of approximately 14ha in the area of broadleaved woodland required for the construction of the scheme compared with the main ES. The AP2 revised scheme will therefore result in the loss of approximately 296ha of broadleaved woodland. This remains less than 0.1% of the resource in England, as reported in the main ES¹³;
- neutral grassland: a net reduction of approximately 1ha in the extent of unimproved and semi-improved grassland required for the construction of the scheme compared with the main ES. The AP2 revised scheme will therefore result in a slight reduction in the extent of losses reported in the main ES (approximately 170ha); and
- hedgerows: a net reduction in the extent of hedgerow losses by approximately 8km compared with the main ES. The AP2 revised scheme will therefore result in the loss of approximately 482km of hedgerows.

- 15.2.8 In relation to hedgerows, the losses predicted under the AP2 revised scheme represent a worst-case scenario which is based on the assumption that all hedgerows within the land required for the construction of the AP2 revised scheme will be lost. During detailed design, efforts will be made to avoid loss of hedgerows wherever practicable to do so and where this is not possible, hedgerows will be reinstated or re-provided through a network of hedgerows or other linear planting on either side of the AP2 revised scheme. Following the implementation of these measures, no permanent significant residual effects on hedgerow networks are likely to occur.
- 15.2.9 In comparison with the original scheme the AP2 amendments will reduce the loss of habitats of principal importance listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act¹⁴ affected by the scheme by approximately 12ha. Therefore, overall, the AP2 revised scheme will result in the loss of approximately 318ha of habitats of principal importance, including approximately 181ha of lowland mixed deciduous woodland (a reduction of approximately 14ha compared with the main ES) and 41ha of lowland meadows (an increase of approximately 1ha compared with the main ES).
- 15.2.10 Several of the proposed AP2 amendments involve or necessitate revisions to the ecological compensation areas included within the original scheme. Overall the AP2 amendments result in a net reduction of approximately 1ha in the extent of habitats of principal importance that will be created within the AP2 revised scheme. However, in addition to the habitat creation proposed, the AP2 revised scheme includes a further area of approximately 6ha of existing woodland habitat at Marlowes Wood which will be managed to enhance its ecological value.

Protected and/or notable species

- 15.2.11 The SES reports a significant adverse residual effect on the Natterer's bat population at Radstone (CFA14). AP2-014-006 provides a new green bridge that will provide a safe crossing point for Natterer's bat and will reduce potential mortality due to train strike to a level where there is no significant effect on the conservation status of the population concerned.

¹³ Natural England (2008) State of the Natural Environment 2008 (NE85)

¹⁴ Natural Environment and Rural Communities Act (2006). Her Majesty's Stationary Office.

- 15.2.12 Two AP2 amendments (AP-012-004 and AP-012-006) are of particular relevance to the population of Bechstein's and other woodland bats associated with woodlands either side of the scheme in Waddesdon and Quainton (CFA12). Further details are provided in the SES and AP2 ES Volume 2 report for CFA14. With the incorporation of appropriate controls on lighting and some minor adjustments to planting design within the limits of the existing Bill, no different effects on Bechstein's and other woodland bats are expected as a consequence of the proposed amendments.
- 15.2.13 No other AP2 amendments are expected to result in new or different likely significant effects on protected and/or notable species at the route-wide level.

Cumulative effects

- 15.2.14 Volume 3 of the AP1 ES reported that the amendments within AP1 would result in additional losses of broadleaved woodland (0.4ha), neutral grassland (0.5ha) and hedgerow (1.1km). These changes were not considered to represent new or different significant effects at a route-wide level for ecology.
- 15.2.15 The proposed AP2 amendments occurring in combination with the AP1 amendments would result in minor additional losses of broadleaved woodland (0.4ha), neutral grassland (0.5ha) and hedgerow (1.1km). However, the additional losses are not considered a material change to those reported in the AP2 revised scheme, and therefore are not considered to result in new or different effects at the route-wide level for ecology.
- 15.2.16 No other new or different likely significant effects relevant at a route-wide level are expected as a consequence of AP2 amendments occurring in combination with AP1 amendments.

16 Landscape and visual assessment

16.1 Introduction

- 16.1.1 Volume 3 of the main ES reported no significant route-wide effects on landscape and visual receptors arising from the construction or operation of the original scheme. Due to its importance, the effects on the Chilterns AONB were assessed in their own right and reported in Section 2 of Volume 3 of the main ES (and Section 2 of this report).
- 16.1.2 Volume 3 of the AP1 ES reported that the amendments within AP1 would not generate new or different significant effects at a route-wide level for landscape and visual assessment.
- 16.1.3 Section 6 of this volume reported that the SES design changes will not generate any new or different significant route-wide effects.

16.2 Changes to the assessment of effects

- 16.2.1 None of the amendments proposed as part of the AP2 revised scheme will give rise to any new or different significant route-wide effects from the original scheme, AP1 revised scheme or SES scheme.

17 Socio-economics

17.1 Introduction

17.1.1 Direct and indirect socio-economic effects of the original scheme were reported in the main ES at a route-wide and CFA level. The assessment in Volume 3 of the main ES considered:

- route-wide construction employment created (direct and indirect);
- employment in businesses directly and indirectly affected by construction;
- operational employment; and
- operational effects on existing business employment.

17.1.2 Volume 3 of the AP1 ES reported that the amendments within AP1 would not generate new or different significant effects at a route-wide level for socio-economics.

17.1.3 Section 7 of this volume reports that the SES design changes will not generate new or different significant route-wide effects.

17.2 Changes to the assessment of effects

17.2.1 The amendments will have minimal impacts on total numbers of existing employment affected by construction and total numbers of construction employment created. Whilst the employment figures given in Volume 3 of the main ES may change to a very small degree, any such change is considered to be negligible and will not change the conclusions of the assessment.

17.2.2 None of the amendments proposed as part of the AP2 revised scheme have been identified to result in any new or different significant route-wide effects from those presented in Volume 3 of the main ES, Volume 3 of the AP1 ES or in Section 7 of this volume.

18 Traffic and transport

18.1 Introduction

18.1.1 Volume 3 of the main ES provided an overview of the approach to and conclusions from the route-wide traffic and transport assessment. It considered the impacts that may occur over a wide area due to changes in travel patterns.

18.1.2 Volume 3 of the AP1 ES reported that the amendments within AP1 would not generate new or different significant effects at a route-wide level for traffic and transport.

18.1.3 Section 8 of this volume presents a number of corrections to the route-wide assessment reported in the main ES. The corrections result in minor local changes, which do not generate any new or different significant route-wide effects.

18.2 Changes to the assessment of effects

18.2.1 None of the amendments proposed as part of the AP2 revised scheme will give rise to any new or different significant route-wide effects from the original scheme, AP1 revised scheme or SES scheme.

19 Waste and material resources

19.1 Introduction

- 19.1.1 Volume 3 of the main ES presented a route-wide assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste that will be generated by the construction and operation of the original scheme.
- 19.1.2 The waste and material resources topic was scoped out of Volume 3 of the AP1 ES as it was assessed that the AP1 amendments would not give rise to issues that would be material to the consideration of new or different significant environmental route-wide effects with regard to waste and material resources.
- 19.1.3 This section presents the route-wide assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste that will be generated by the construction and operation of the AP2 revised scheme. As the SES changes form part of the AP2 revised scheme, they have also been included.
- 19.1.4 Excavated material data pertaining to the AP1 amendments have also been included within this route-wide assessment for the AP2 revised scheme. This approach ensures that the worst-case scenario is assessed, however given the negligible contribution anticipated from the AP1 revised scheme; it is considered that its inclusion in the assessment does not vary materially the conclusions reached.
- 19.1.5 This assessment considers:
- the types and quantity of waste that will be generated;
 - the quantity of waste that will require off-site disposal to landfill; and
 - the availability of off-site landfill disposal capacity.
- 19.1.6 Consideration of material resources in this assessment is limited to the beneficial reuse of excavated material arising from the construction of the AP2 revised scheme. Only if excavated material is not required or is unsuitable for the construction of the AP2 revised scheme will it be considered waste.
- 19.1.7 An overview of the types and quantity of waste that will be generated within each CFA where potentially significant effects have been identified is presented within Appendix WM-001-000 (Volume 5).

19.2 Policy framework

National policy framework

- 19.2.1 Since the issue of the main ES in November 2013, a number of changes have taken place to the waste policy framework in the UK.
- 19.2.2 Planning Policy Statement 10 (PPS10): Planning for Sustainable Waste Management¹⁵ has been replaced by the updated National Planning Policy for Waste¹⁶. The updated

¹⁵ DCLG (2011), Planning Policy Statement 10: Planning for Sustainable Waste Management. London, HMSO.

¹⁶ DCLG (2014), *National Planning Policy for Waste*;

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/364759/141015_National_Planning_Policy_for_Waste.pdf;

National Planning Policy for Waste establishes detailed waste planning policies which all local planning authorities must follow when discharging their responsibilities regarding waste management. This introduces the concept of on-site management of waste where it arises.

- 19.2.3 A revised version of the Waste Management Plan for England¹⁷ was issued in December 2013. The changes to the Waste Management Plan for England do not contain any new waste management measures or policies, but reflect issues raised in the prior consultation exercise. This introduces an increased emphasis on waste planning authorities providing additional infrastructure that complies with the 'proximity principle'.
- 19.2.4 In December 2013, the Government issued documents constituting a Waste Prevention Programme for England¹⁸. This was produced under a requirement of the revised EU Waste Framework Directive (rWFD)¹⁹, and establishes the Government's framework on measures to minimise the quantity of waste generated. The Waste Prevention Programme for England develops the key roles and actions which need to be carried out during the transition towards a more resource efficient economy. The principles of resource efficiency and waste prevention have been incorporated into the AP2 revised scheme.

Regional policy framework

- 19.2.5 In March 2015, the Mayor of London published and adopted the Further Alterations to the London Plan (FALP)²⁰. No material changes relating to the management of waste from the AP2 revised scheme are included in the document.

19.3 Scope, assumptions and limitations

- 19.3.1 The assessment assumptions and limitations remain unchanged from those described in the main ES, as set out in Volume 3, Section 14.3.

19.4 Assessment methodology

- 19.4.1 The assessment methodology remains unchanged from that described in the main ES, as set out in Volume 3, Section 14.4.
- 19.4.2 The consequences of the SES design changes and AP2 amendments on waste generation from construction and operation have been quantitatively assessed for each CFA and then amalgamated for the AP2 revised scheme as a whole. Both the SES design changes and AP2 amendments have been included in the AP2 revised scheme route-wide assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste.

Accessed 11 May 2015.

¹⁷ Defra (2013), Waste Management Plan for England;

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265810/pb14100-waste-management-plan-20131213.pdf;

Accessed 11 May 2015.

¹⁸ HM Government (2013), *Prevention is better than cure: The role of waste prevention in moving to a more resource efficient economy*;

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265022/pb14091-waste-prevention-20131211.pdf; Accessed 15 May 2015.

¹⁹ The revised EU Waste Framework Directive was adopted on 20 October 2008, signed on behalf of the European Parliament and the Council on 19 November 2008, and published in the Official Journal of the European Union on 22 November (L312/3) as Directive 2008/98/EC. The rWFD entered in to force on 12 December 2008; <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN>; Accessed 3 June 2015.

²⁰ Mayor of London (2015), the Further Alterations to the London Plan; <http://www.london.gov.uk/priorities/planning/london-plan/further-alterations-to-the-london-plan>; Accessed 7 May 2015.

19.5 Environmental baseline

Waste arisings and management

- 19.5.1 Arisings and management of construction, demolition and excavation waste (CDEW), and commercial and industrial (C&I) waste, remain unchanged from that described and assessed in Volume 3 of the main ES.

Waste infrastructure

General

- 19.5.2 Following submission of the Bill, further data has been published by the Environment Agency on the waste infrastructure capacity within each of the county and former regional planning areas through which the AP2 revised scheme will pass. This has been used to inform the baseline and future baseline described in this section. Waste infrastructure capacity is not reported herein on a national basis since it is not required for use in this assessment.
- 19.5.3 Environment Agency data provides both a credible and reliable source of information that is consistent and comparable across all counties and regions. Permitted landfill capacity data from the Environment Agency has also been used to inform the significance criteria used in this assessment.

Baseline

- 19.5.4 Table 3 provides baseline waste infrastructure capacity data for the aggregated five regions through which the AP2 revised scheme will pass.
- 19.5.5 The baseline information presented has been updated and is based on the latest permitted capacity for all types of waste treatment and disposal facilities for 2013, published by the Environment Agency²¹ in December 2014. Waste infrastructure capacity for all types of treatment and disposal facility (including incineration, transfer and treatment) is reported in the baseline to provide context for this assessment.
- 19.5.6 Baseline waste infrastructure capacity data for the relevant London boroughs and counties within each of the five regions is shown in Appendix WM-002-000 (Volume 5).

Table 3: Baseline waste infrastructure capacity by region, 2013

| Facility type | Greater London (tonnes) | South East (tonnes) | East of England (tonnes) | East Midlands (tonnes) | West Midlands (tonnes) | Total (tonnes) |
|------------------------------|-------------------------|---------------------|--------------------------|------------------------|------------------------|----------------|
| Inert waste landfill | 2,413,137 | 28,503,510 | 24,161,018 | 40,026,045 | 23,922,977 | 119,026,687 |
| Non-hazardous waste landfill | 4,360,857 | 47,164,513 | 38,276,158 | 39,375,422 | 40,313,994 | 169,490,944 |
| Hazardous waste | 325,734 | 1,297,680 | 0 | 385,176 | 997,572 | 3,006,162 |

²¹ Environment Agency; Waste Management for England 2013; <https://www.gov.uk/government/statistics/waste-management-for-england-2013>; Accessed 08 April 2015.

SES and AP2 ES Volume 3 - Route-wide effects

| Facility type | Greater London (tonnes) | South East (tonnes) | East of England (tonnes) | East Midlands (tonnes) | West Midlands (tonnes) | Total (tonnes) |
|---|----------------------------|------------------------|--------------------------------|---------------------------|------------------------------|-------------------|
| landfill | | | | | | |
| Subtotal landfill capacity | 7,099,728 | 76,965,703 | 62,437,175 | 79,786,643 | 65,234,542 | 291,523,791 |
| Annual municipal waste, C&I waste incineration capacity | 1,863,000 | 1,762,350 | 0 | 414,000 | 1,440,000 | 5,479,350 |
| Annual other incineration ²² capacity | 227,000 | 668,590 | 1,061,000 | 722,943 | 425,960 | 3,105,493 |
| Sub-total annual incineration capacity | 2,090,000 | 2,430,940 | 1,061,000 | 1,136,943 | 1,865,960 | 8,584,843 |
| Annual waste transfer capacity | 7,325,907 | 6,803,958 | 4,562,872 | 3,285,232 | 3,992,592 | 25,970,561 |
| Annual waste treatment capacity | 4,783,250 | 7,505,492 | 5,136,981 | 4,637,407 | 3,837,934 | 25,901,064 |
| Annual metal recycling capacity | 1,102,782 | 1,948,759 | 2,176,072 | 1,118,150 | 1,585,624 | 7,931,387 |
| Sub-total annual treatment and waste transfer capacity | 13,211,938 | 16,258,208 | 11,875,924 | 9,040,789 | 9,416,150 | 59,803,009 |
| Total capacity (2013) | 22,401,665 | 95,654,851 | 75,374,099 | 89,964,875 | 76,516,652 | 359,912,143 |
| Total capacity in main ES (2011) | 21,984,250 | 115,267,860 | 68,612,820 | 77,844,710 | 68,609,350 | 352,318,990 |
| Percentage change from 2011 capacity ²³ | 2% | -17% | 10% | 16% | 12% | 2% |

19.5.7 The landfill capacity information is published by the Environment Agency in cubic metres but has been converted to tonnes using the landfill density conversion factors as stated in the main ES, Volume 3, Section 14.5.29.

Future Baseline

General

19.5.8 It is expected that various types of waste infrastructure capacity will continue to be available during the period 2017 to 2025 (for construction) and 2026 (for operation).

²² Other incineration includes incineration facilities permitted to treat animal by-products, animal carcasses, clinical waste, hazardous waste, and sewage sludge.

²³ Negative percentages indicates less capacity available in 2012 than in 2011.

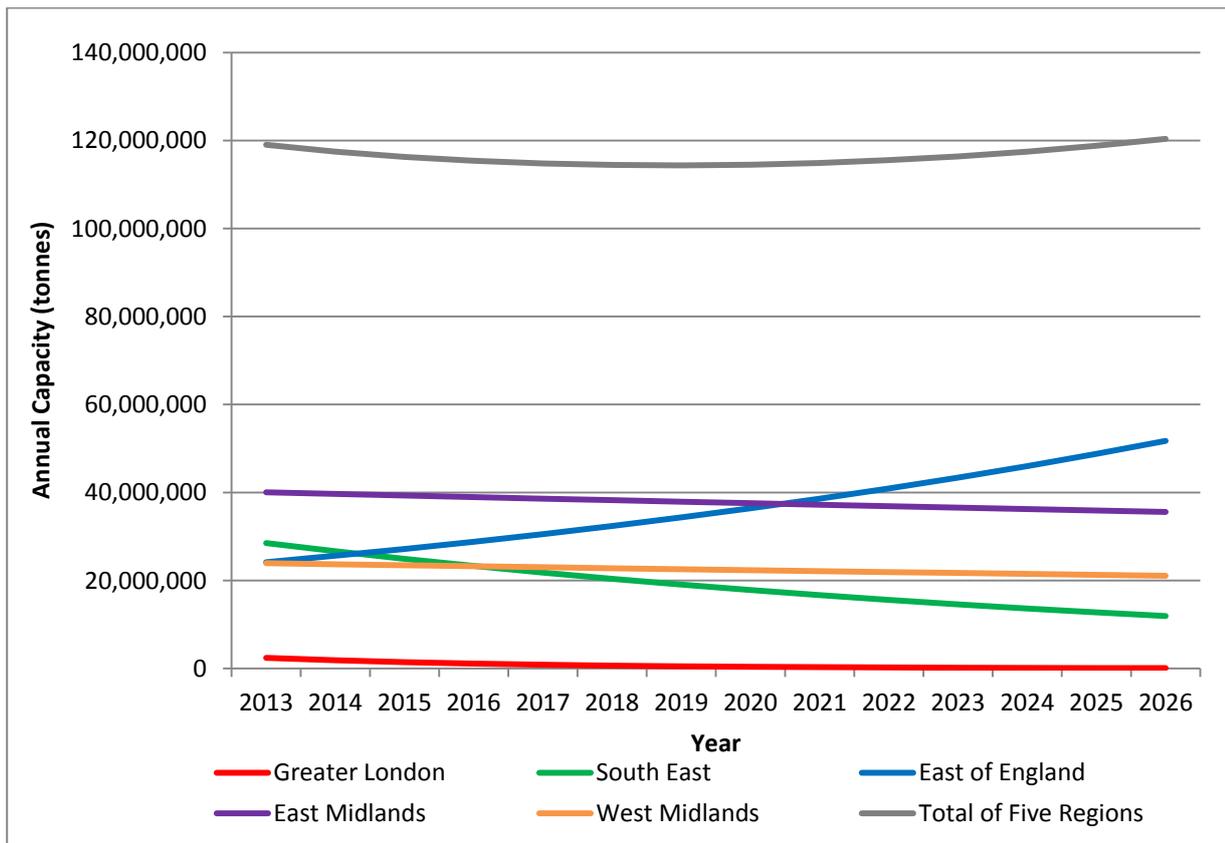
19.5.9 Permitted capacity data published by the Environment Agency has been used to provide an indication of projected landfill capacity for the future baseline. The approach and methodology used to establish the future baseline for the AP2 revised scheme is as stated in the main ES, Volume 3, Section 14.5.31 to 14.5.37. However, the following amendments have been made to reflect further data published by the Environment Agency:

- the projected landfill capacity is based on the average percentage change in permitted landfill capacity for the years 2004 to 2013 (for inert and non-hazardous waste landfills) and for the years 2006 to 2013 (for hazardous waste landfill); and
- the average percentage change has then been applied to the reported 2013 permitted landfill capacity and projected forward to 2026.

Inert waste landfill capacity

19.5.10 Using latest available data for 2013 (published in December 2014) as a starting point, Figure 1 shows projected inert waste landfill capacity for the future baseline period 2017 to 2025 (for construction) and the year 2026 (for operation). Detailed source data is presented in Appendix WM-002-000 (Volume 5).

Figure 1: Projected (future baseline) inert waste landfill capacity by region

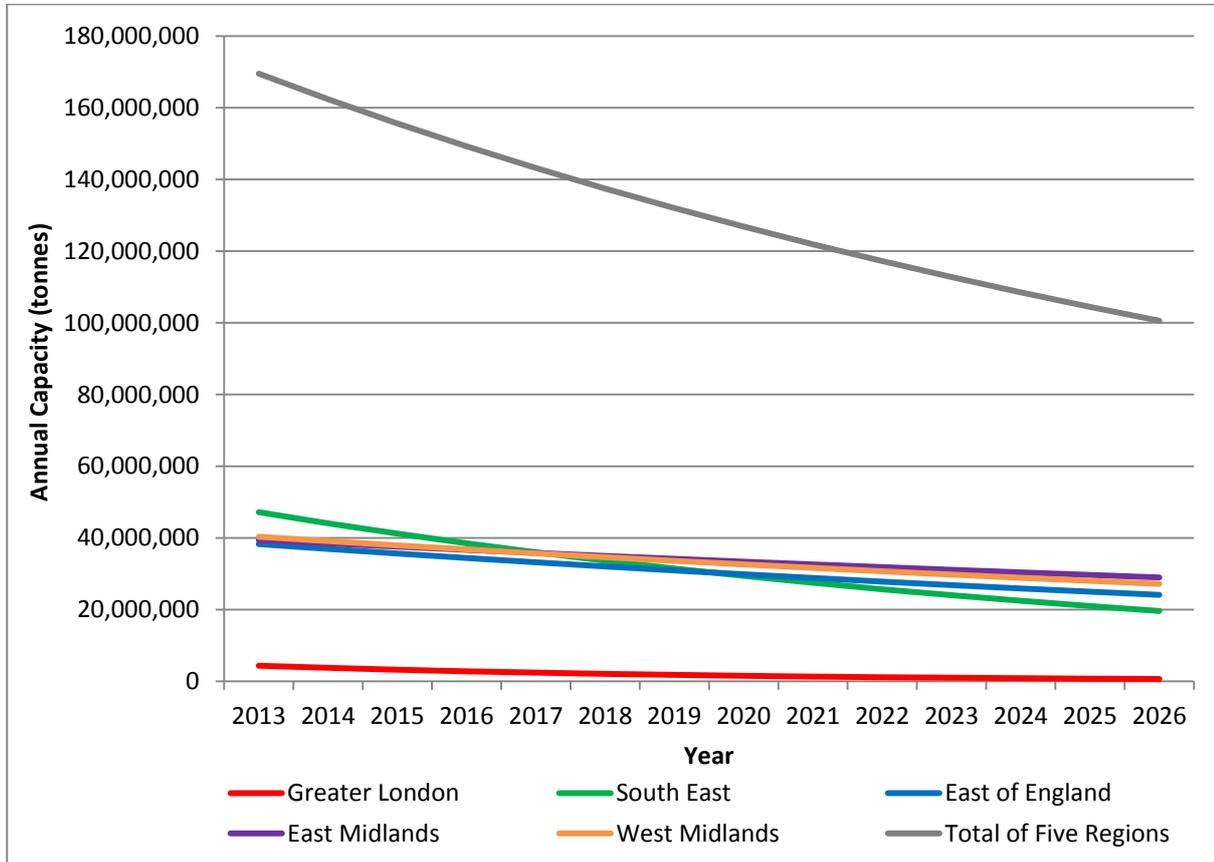


19.5.11 Figure 1 shows that by 2026 there will be approximately 120 million tonnes of inert waste landfill capacity remaining in the aggregated five regions through which the AP2 revised scheme will pass. Inert waste landfill capacity is projected to decline in four of the five regions throughout the period to 2026; the exception is for East of England where inert waste landfill capacity is projected to increase.

Non-hazardous waste landfill capacity

19.5.12 Using latest available published data for 2013 (published in December 2014) as a starting point, Figure 2 shows projected non-hazardous waste landfill capacity for the future baseline period 2017 to 2025 (for construction) and the year 2026 (for operation). Detailed source data is presented in Appendix WM-002-000 (Volume 5).

Figure 2: Projected (future baseline) non-hazardous waste landfill capacity by region

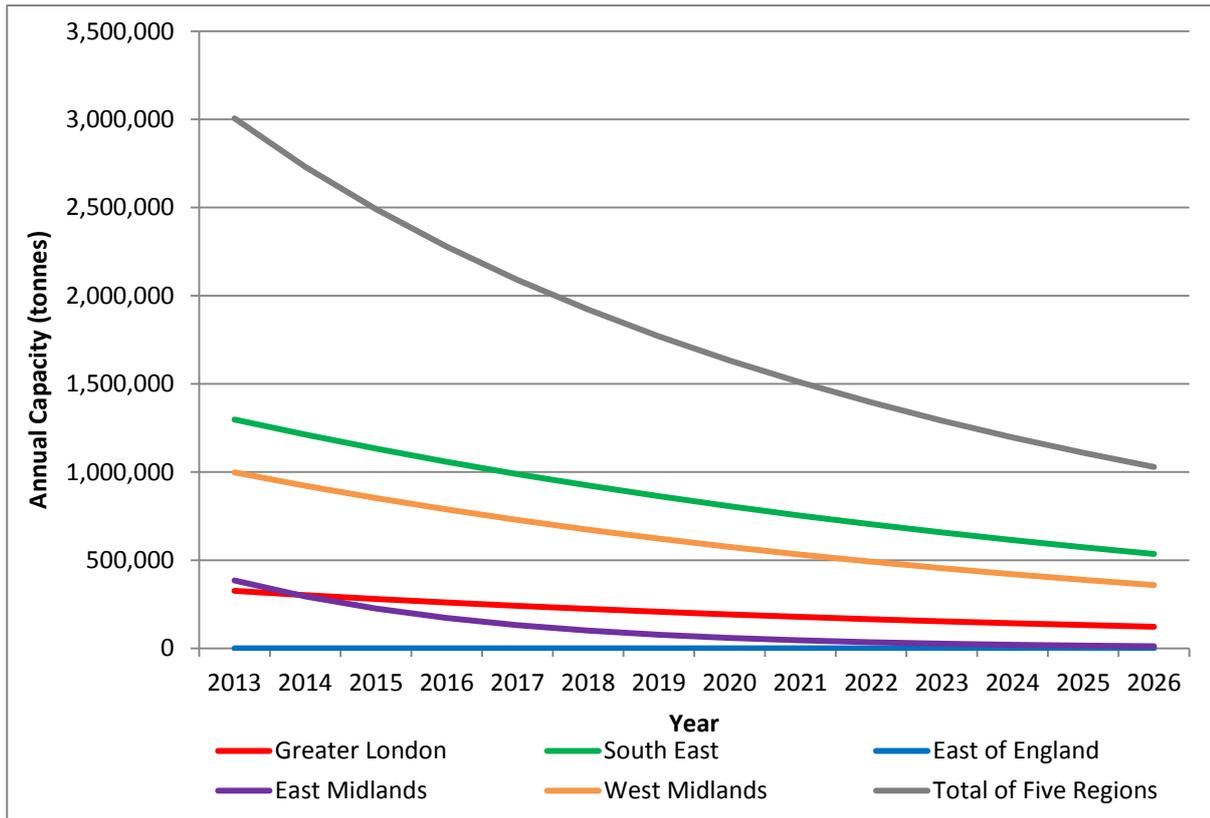


19.5.13 Figure 2 shows that by 2026 there will be approximately 101 million tonnes of non-hazardous waste landfill capacity remaining in the aggregated five regions through which the AP2 revised scheme will pass. This is a reduction of nearly 69 million tonnes of non-hazardous waste landfill capacity from 2013, which reflects a gradual decline in the non-hazardous waste landfill capacity in each of the five regions.

Hazardous waste landfill capacity

19.5.14 Using latest available published data for 2013 (published in December 2014) as a starting point, Figure 3 shows projected hazardous waste landfill capacity for the future baseline period 2017 to 2025 (for construction) and the year 2026 (for operation). Detailed source data is presented in the SES and AP2 ES Appendix WM-002-000 (Volume 5).

Figure 3: Projected (future baseline) hazardous waste landfill capacity by region



19.5.15 Figure 3 shows that by 2026 there will be approximately one million tonnes of hazardous waste landfill capacity remaining in the aggregated five regions through which the AP2 revised scheme will pass.

19.6 Assessment of effects during construction

Avoidance and mitigation measures

19.6.1 The provision of mitigation measures during construction is unchanged from that described in Volume 3 of the main ES with the exception of sustainable placement mitigation measures.

19.6.2 The main ES reported that three SPAs have been selected on the basis of their suitability for the on-site disposal of surplus excavated material to avoid causing environmental effects²⁴ that would otherwise be associated with the off-site disposal of that material.

19.6.3 The SES (Part 1) reports that the SPA near Hunt’s Green Farm at South Heath, (which was planned for the on-site placement of approximately 1,928,002 tonnes of surplus excavated material) will no longer be used. The impact of this change is considered in the assessment of likely significant environmental effects with regard to inert waste landfill capacity.

19.6.4 The SPAs are shown in Table 4. The on-site placement for disposal of surplus excavated material will reduce the quantity of inert surplus excavated material to be disposed off-site to landfill by approximately 4,928,958 tonnes (6,856,960 tonnes in Volume 3 of the main ES).

²⁴ Primarily transportation effects and the associated environmental effects of noise, air quality and climate change.

SES and AP2 ES Volume 3 - Route-wide effects

Table 4: Sustainable placement areas for the AP2 revised scheme

| Sustainable placement area reference | Quantity (tonnes) | Regional area | Sustainable placement area | Map references |
|--------------------------------------|-------------------|----------------|----------------------------|---|
| SPA1 | 2,884,487 | Greater London | Four sites at Harvil Road | Maps unchanged from main ES |
| SPA2 | 0 | South East | South Heath | Removed from AP2 revised scheme as shown on CT-05-035 ²⁵ |
| SPA3 | 2,044,471 | South East | Calvert | CT-06-055 ²⁶ |
| Total | 4,928,958 | - | - | - |

- 19.6.5 Other environmental controls previously described in Volume 3 of the main ES will apply to the management of CDEW and worker accommodation site waste generated during construction of the AP2 revised scheme.

Assessment of impacts and effects

Waste forecast

Excavated material quantities

- 19.6.6 Table 5 presents a route-wide summary of the revised forecast excavated material quantities for the AP2 revised scheme (including the SES design changes). This is based on the calculated figures for the integrated earthworks design and reflects the balance of excavated material across the AP2 revised scheme. A detailed excavated material quantity forecast is provided in Appendix WM-001-000 (Volume 5) which contains changes that have been considered potentially significant. A complete set of excavated material quantity forecasts is included in the Appendix WM-001-000 Annex 1 (Volume 5). For the purpose of this assessment, it has been assumed as a worst-case scenario that all of this material will be disposed off-site to landfill.

Table 5: Forecast excavated material quantities for the original scheme and AP2 revised scheme, 2017 to 2025

| Excavated material management methods | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme total |
|--|---|--|--|
| Quantity of excavated material reused for engineering and environmental mitigation earthworks (including all topsoil and agricultural subsoil) | 116,649,579 | 111,235,950 | 87% |
| Quantity of surplus excavated material for sustainable placement | 6,856,960 | 4,928,958 | 4% |
| Quantity of surplus excavated material for off-site disposal to landfill | 4,492,557 | 12,220,286 | 9% |

²⁵ CFA10 (Dunsmore, Wendover and Halton).

²⁶ CFA 13 (Calvert, Steeple Claydon, Twyford and Chetwode).

SES and AP2 ES Volume 3 - Route-wide effects

| Excavated material management methods | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme total |
|---------------------------------------|---|--|--|
| Total | 127,999,096 | 128,385,194 | 100% |

- 19.6.7 The AP2 revised scheme will generate approximately 128,385,194 tonnes of excavated material during the period 2017 to 2025. This represents a 0.3% increase on the quantities reported for the original scheme.
- 19.6.8 Table 5 shows that 87% of the excavated material generated by the AP2 revised scheme will be reused to satisfy the necessary engineering and environmental mitigation earthworks quantities required on a route-wide basis. This represents a slight decrease from 91% reported in Volume 3 of the main ES.
- 19.6.9 The majority of the reduction in on-site reuse results from AP2 amendments in CFA22 which affect the quantity of fill material required by the AP2 revised scheme. The design changes proposed in CFA22 lead to a reduction in fill requirement of 5,822,694 tonnes, when compared with the original scheme.
- 19.6.10 The means of classification and classes of excavated material suitable for use as engineering fill material and for environmental mitigation earthworks remains unchanged from Volume 3 of the main ES.
- 19.6.11 The estimated quantity of surplus excavated material that will not be reused within the construction of the AP2 revised scheme will be approximately 13% of the overall excavated material that will be generated on a route-wide basis. This will comprise of:
- approximately 4,928,958 tonnes of surplus excavated material that will be managed via sustainable placement; and
 - approximately 12,220,286 tonnes of surplus excavated material that will require off-site disposal to landfill.
- 19.6.12 The quantity of surplus excavated material that will be disposed off-site to each class of landfill, unless used for other purposes is shown in Table 6.

Table 6: Quantity of surplus excavated material requiring off-site disposal to landfill (by class of landfill) original scheme and AP2 revised scheme, 2017 to 2025

| Class of landfill | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme total |
|--|---|--|--|
| Quantity of surplus excavated material for off-site disposal to inert waste landfill | 3,760,937 | 11,311,251 | 92% |
| Quantity of surplus excavated material for off-site disposal to non-hazardous waste landfill | 394,329 | 439,498 | 4% |

| Class of landfill | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme total |
|--|---|--|--|
| Quantity of surplus excavated material for off-site disposal to hazardous waste landfill | 337,291 | 469,537 | 4% |
| Total | 4,492,557 | 12,220,286 | 100% |

Surplus excavated material for off-site disposal to inert waste landfill

19.6.13 Table 6 shows that, as in Volume 3 of the main ES, the majority (approximately 92%) of surplus excavated material requiring off-site disposal to landfill for the AP2 revised scheme will be inert in nature. This represents an increase of 8% compared with 84% reported in Volume 3 of the main ES for the original scheme. However, the AP2 revised scheme also noticeably increases the overall total quantity of surplus excavated material requiring off-site disposal to landfill by approximately three times compared to the main ES.

19.6.14 Opportunities may arise at the time of construction to provide inert surplus excavated material for off-site reuse in other construction projects, thereby increasing the diversion of this material from landfill.

Surplus excavated material for off-site disposal to non-hazardous waste landfill

19.6.15 Surplus excavated material that will require off-site disposal to non-hazardous waste landfill represents the quantity of Unacceptable Class U1B material²⁷ that will be generated by the AP2 revised scheme, which has increased by 11% to approximately 439,498 tonnes.

19.6.16 This material will not be suitable either for reuse within the AP2 revised scheme or sustainable placement (without treatment) due to its chemical properties.

Surplus excavated material for off-site disposal to hazardous waste landfill

19.6.17 Surplus excavated material that will require off-site disposal to hazardous waste landfill represents the quantity of Unacceptable Class U2 material²⁸ that will be generated by the AP2 revised scheme, which has increased by 39% to approximately 469,537 tonnes. The majority of this change results from the 164,639 tonnes of Unacceptable Class U2 material forecast to be generated at the relocated HEx depot at Langley, resulting from the changes in amendment AP-C221-031.

19.6.18 Unacceptable Class U2 material will be unsuitable for reuse within the AP2 revised scheme and for sustainable placement due to its hazardous nature.

²⁷ Unacceptable material Class U1B is 'chemically' unsuitable as defined in the Specification for Highway Works, Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clause 2(ii)(a).

²⁸ Unacceptable material Class U2 'hazardous waste', as described in the Specification for Highway Works, Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clause 3(i).

Demolition material and waste quantities

- 19.6.19 Table 7 presents a summary of the forecast demolition material and waste quantities for the AP2 revised scheme. A regional and route-wide summary is shown to indicate where along the route demolition materials will be generated and managed²⁹. A detailed demolition material and waste quantity forecast is provided in Appendix WM-001-000 (Volume 5).
- 19.6.20 The AP2 revised scheme will generate approximately 1,696,794 tonnes of demolition material during the overall construction period of 2017 to 2025. This represents a 6% increase on the quantities reported for the original scheme.

Table 7: Forecast demolition material and waste quantities (by region) for the original scheme and AP2 revised scheme, 2017 to 2025

| Regional area | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Quantity diverted from landfill original scheme (tonnes) | Quantity diverted from landfill AP2 revised scheme (tonnes) | Quantity for off-site disposal to landfill original scheme (tonnes) | Quantity for off-site disposal to landfill AP2 revised scheme (tonnes) |
|-----------------|---|--|--|---|---|--|
| Greater London | 601,112 | 692,464 | 541,001 | 623,218 | 60,111 | 69,246 |
| South East | 74,510 | 77,010 | 67,059 | 69,309 | 7,451 | 7,701 |
| East of England | 2,478 | 2,478 | 2,230 | 2,230 | 248 | 248 |
| East Midlands | 44,308 | 44,451 | 39,877 | 40,006 | 4,431 | 4,445 |
| West Midlands | 879,333 | 880,391 | 791,399 | 792,351 | 87,934 | 88,039 |
| Total | 1,601,741 | 1,696,794 | 1,441,566 | 1,527,114 | 160,175 | 169,679 |

- 19.6.21 The quantity of demolition material that will be diverted from landfill via reuse, recycling and recovery is based on a landfill diversion rate of 90%, as stated in Volume 3 of the main ES.
- 19.6.22 It has been assumed, as a reasonable worst-case scenario for the purpose of this assessment that the remaining 10% of demolition material that will be generated will be disposed of off-site to landfill. The quantity of demolition waste that will require off-site disposal to landfill during the overall construction period of 2017 to 2025 will be approximately 169,679 tonnes. The class of landfill to which demolition waste will be sent for disposal is shown in Table 8.

Table 8: Quantity of demolition waste requiring off-site disposal to landfill (by class of landfill), original scheme and AP2 revised scheme, 2017 to 2025

| Class of landfill | Total Quantity original scheme | Total quantity AP2 revised scheme | Proportion of AP2 revised scheme total |
|-------------------|--------------------------------|-----------------------------------|--|
|-------------------|--------------------------------|-----------------------------------|--|

²⁹ It has been assumed that demolition materials will be largely managed within the region in which they will be generated.

SES and AP2 ES Volume 3 - Route-wide effects

| | (tonnes) | (tonnes) | |
|--|----------|----------|------|
| Quantity of demolition waste for off-site disposal to inert waste landfill | 0 | 0 | 0% |
| Quantity of demolition waste for off-site disposal to non-hazardous waste landfill | 96,105 | 101,808 | 60% |
| Quantity of demolition waste for off-site disposal to hazardous waste landfill | 64,070 | 67,872 | 40% |
| Total | 160,175 | 169,679 | 100% |

19.6.23 For the purpose of this assessment, it has been assumed that 60% of the quantity of demolition waste requiring off-site disposal to landfill will be non-hazardous waste and 40% will be hazardous waste, as stated in Volume 3 of the main ES.

Construction waste quantities

19.6.24 Table 9 presents a summary of the forecast construction waste quantities for the AP2 revised scheme. A regional and route-wide summary is shown to provide an indication of where along the route construction waste will be generated and managed³⁰. A detailed construction waste quantity forecast is provided in Appendix WM-001-000 (Volume 5).

19.6.25 Using the waste forecast methodology described in the main ES, the AP2 revised scheme will generate approximately 2,882,051 tonnes of construction waste during the overall construction period of 2017 to 2025. This represents approximately a 6% increase over the quantity reported for the original scheme in Volume 3 of the main ES.

Table 9: Forecast construction waste quantities (by region) original scheme and AP2 revised scheme, 2017 to 2025

| Regional area | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Quantity diverted from landfill original scheme (tonnes) | Quantity diverted from landfill AP2 revised scheme (tonnes) | Quantity for off-site disposal to landfill original scheme (tonnes) | Quantity for off-site disposal to landfill AP2 revised scheme (tonnes) |
|-----------------|---|--|--|---|---|--|
| Greater London | 1,315,930 | 1,388,482 | 1,184,337 | 1,249,634 | 131,593 | 138,848 |
| South East | 470,119 | 491,067 | 423,107 | 441,960 | 47,102 | 49,107 |
| East of England | 15,035 | 112 | 13,531 | 101 | 1,504 | 11 |
| East Midlands | 126,292 | 114,056 | 113,663 | 102,650 | 12,629 | 11,406 |
| West Midlands | 800,442 | 888,334 | 720,398 | 799,501 | 80,044 | 88,833 |
| Total | 2,727,818 | 2,882,051 | 2,455,036 | 2,593,845 | 272,782 | 288,205 |

³⁰ It has been assumed that construction waste will be largely managed within the region in which it will be generated.

- 19.6.26 The quantity of construction waste that will be diverted from landfill via reuse, recycling and recovery is based on a landfill diversion rate of 90%, as stated in Volume 3 of the main ES.
- 19.6.27 It has been assumed, as a reasonable worst-case scenario for the purpose of this assessment that the remaining 10% of construction waste that will be generated will be disposed of off-site to landfill. The quantity of construction waste that will require off-site disposal to landfill during the overall construction period of 2017 to 2025 will be approximately 288,205 tonnes.
- 19.6.28 It has been assumed for the purpose of this assessment that all of the construction waste requiring off-site disposal to landfill will be sent to non-hazardous waste landfill, as stated in Volume 3 of the main ES.

Worker accommodation site waste

- 19.6.29 Table 10 presents a summary of the forecast worker accommodation site waste quantities for the AP2 revised scheme. A regional and route-wide summary is shown to provide an indication of where along the route worker accommodation site waste will be generated and managed³¹. A detailed worker accommodation site waste quantity forecast is provided in the Appendix WM-001-000 (Volume 5).
- 19.6.30 Using the waste forecast methodology described in the main ES, the AP2 revised scheme will generate approximately 1,886 tonnes of worker accommodation site waste during the overall construction period of 2017 to 2025. Worker accommodation site waste will be managed as C&I waste. This represents approximately a 2% decrease in waste compared with the quantity reported for the original scheme in Volume 3 of the main ES.

Table 10: Forecast worker accommodation site waste quantities (by region) original scheme and AP2 revised scheme, 2017 to 2025

| Regional area | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Quantity diverted from landfill original scheme (tonnes) | Quantity diverted from landfill AP2 revised scheme (tonnes) | Quantity for off-site disposal to landfill original scheme (tonnes) | Quantity for off-site disposal to landfill AP2 revised scheme (tonnes) |
|-----------------|---|--|--|---|---|--|
| Greater London | 134 | 134 | 67 | 67 | 67 | 67 |
| South East | 708 | 708 | 354 | 354 | 354 | 354 |
| East of England | 71 | 71 | 36 | 36 | 35 | 36 |
| East Midlands | 281 | 281 | 140 | 140 | 141 | 140 |
| West Midlands | 723 | 692 | 361 | 346 | 362 | 346 |
| Total | 1,917 | 1,886 | 958 | 943 | 959 | 943 |

³¹ It has been assumed that worker accommodation site waste will be largely managed within the region in which it will be generated.

- 19.6.31 The quantity of worker accommodation site waste that will be diverted from landfill via reuse, recycling and recovery is based on a landfill diversion rate of 50%. Waste generated by occupants of worker accommodation sites will be similar in composition to household waste. As such, this rate has been selected based on a review of national household waste targets for England and Wales and takes into account the most recently published performance data for household waste and local authority collected waste in England (i.e. for the year 2011/12).
- 19.6.32 It has been assumed, as a reasonable worst-case scenario for the purpose of this assessment that the remaining 50% of worker accommodation site waste will be disposed of off-site to landfill. The quantity of worker accommodation site waste that will require off-site disposal to landfill during the overall construction period of 2017 to 2025 will be approximately 943 tonnes.
- 19.6.33 It has been assumed for the purpose of this assessment that all of the worker accommodation site waste requiring off-site disposal to landfill will be sent to non-hazardous waste landfill.

Impact of construction on future baseline waste arisings

Construction, demolition and excavation waste

- 19.6.34 Table 11 provides a summary of material and waste quantities that will be generated by excavation, demolition and construction of the AP2 revised scheme during the period 2017 to 2025.

Table 11: Summary of material and waste quantities that will be generated by excavation, demolition and construction of the original scheme and AP2 revised scheme, 2017 to 2025

| Source | Total quantity of material (tonnes) | Quantity diverted from landfill (tonnes) | Quantity of surplus excavated material for sustainable placement (tonnes) | Quantity for off-site disposal to landfill (tonnes) |
|-------------------------------|-------------------------------------|--|---|---|
| Excavation | 128,385,194 | 111,235,950 | 4,928,957 | 12,220,286 |
| Demolition | 1,696,794 | 1,527,114 | 0 | 169,679 |
| Construction | 2,882,051 | 2,593,845 | 0 | 288,205 |
| Total AP2 revised scheme | 132,964,038 | 115,356,910 | 4,928,957 | 12,678,171 |
| Proportion ³² | 100% | 87% | 4% | 10% |
| Total original scheme | 132,328,655 | 120,546,181 | 6,856,960 | 4,925,514 |
| % change from original scheme | 0.5% | -4.3% | -28.1% | 157.4% |

- 19.6.35 Table 11 shows that the AP2 revised scheme will generate approximately 132,964,038 tonnes of excavated material, demolition material and construction waste during the

³² Numbers do not sum to total due to rounding

SES and AP2 ES Volume 3 - Route-wide effects

period 2017 to 2025. This represents a negligible (0.5%) increase on the excavated material, demolition material and construction waste reported for the original scheme.

- 19.6.36 Approximately 87% of the total quantity will be diverted from landfill via reuse, recycling and recovery. This represents approximately a 4% decrease on the percentage reported for the original scheme.
- 19.6.37 The impact of this material and waste generation and its off-site disposal to landfill is shown in Table 12 as the percentage difference between future baseline CDEW arisings with and without the AP2 revised scheme.
- 19.6.38 Future baseline CDEW arisings are presented as the total quantity projected to be generated during the period 2017 to 2025. The portion expected to be landfilled is included in the assessment of the future baseline landfill capacity, and is expected to be partially offset by future increases in capacity. This is to provide a direct comparison with the total quantity of excavated material, demolition material and construction waste that will be generated during construction of the AP2 revised scheme.

Table 12: Impact of material and waste quantities that will be generated by excavation, demolition and construction of the original scheme and AP2 revised scheme, 2017 to 2025

| Future baseline scenario with and without the AP2 revised scheme | National | | Regional ³³ | |
|---|---------------------------|------------------------------------|---------------------------|------------------------------------|
| | CDEW arisings (tonnes) | CDEW arisings to landfill (tonnes) | CDEW arisings (tonnes) | CDEW arisings to landfill (tonnes) |
| Future baseline waste arisings 2017 to 2025 | 696,378,870 ³⁴ | 178,547,319 ³⁵ | 481,410,000 ³⁶ | 140,553,000 ³⁷ |
| AP2 revised scheme material and waste arisings 2017 to 2025 | 132,964,038 | 12,678,171 | 132,964,038 | 12,678,171 |
| Future baseline waste arisings 2017 to 2025 with the AP2 revised scheme | 829,342,908 | 191,225,490 | 614,374,038 | 153,231,171 |
| Increase in future baseline waste arisings with the AP2 revised scheme | 19% | 7% | 28% | 9% |
| Future baseline waste arisings 2017 to 2025 with the original scheme | 828,707,525 | 183,472,833 | 613,738,655 | 145,478,514 |
| Increase in future baseline waste arisings with the original scheme | 19% | 3% | 27% | 4% |

- 19.6.39 Table 12 shows that the total quantity of excavated material, demolition material and construction waste generated by the AP2 revised scheme will be equivalent to

³³ Based on future baseline CDEW arisings and CDEW to landfill for the aggregated five regions.

³⁴ Based on annual projections of 77,375,430 tonnes nationally as set out in the main ES, Volume 3, Section 14.5.

³⁵ Based on an annual projection of 19,838,591 tonnes nationally as set out in the main ES, Volume 3, Section 14.5.

³⁶ Based on an annual projection of 53,490,000 tonnes for the aggregated five regions as set out in the main ES, Volume 3, Section 14.5.

³⁷ Based on an annual projection of 15,617,000 tonnes for the aggregated five regions as set out in the main ES, Volume 3, Section 14.5.

approximately 19% of national and 28% of regional future baseline CDEW arisings during the period 2017 to 2025. These represent negligible changes from the increases reported for the original scheme.

- 19.6.40 The total quantity of surplus excavated material, demolition waste and construction waste generated by the AP2 revised scheme that will require off-site disposal to landfill will be equivalent to approximately 7% of national and 9% of regional future baseline CDEW arisings to landfill during that time. This represents a 4% increase over the national change reported for the original scheme, and 5% increase over the regional change reported for the original scheme.

Worker accommodation site waste

- 19.6.41 The total quantity of worker accommodation site waste that will be generated during the overall construction period of 2017 to 2025 is shown in Table 13 (along with the quantity that will be diverted from landfill via reuse, recycling and recovery and the quantity that will require off-site disposal to landfill).
- 19.6.42 The impact of worker accommodation site waste generation and off-site disposal to landfill is shown in Table 13 as the percentage difference between future baseline C&I waste arisings with and without the AP2 revised scheme.
- 19.6.43 Future baseline C&I waste arisings are presented as the total quantity projected to be generated during the period 2017 to 2025. This is to provide a direct comparison with the total quantity of C&I waste that will be generated during construction of the AP2 revised scheme.

Table 13: Impact of C&I waste arisings generated for the original scheme and combined AP2 revised scheme, 2017 to 2025

| Future baseline scenario with and without the AP2 revised scheme | National | | Regional ³⁸ | |
|---|-----------------------------|---|-----------------------------|---|
| | C&I waste arisings (tonnes) | C&I waste arisings to landfill (tonnes) | C&I waste arisings (tonnes) | C&I waste arisings to landfill (tonnes) |
| Future baseline waste arisings 2017 to 2025 | 431,352,000 ³⁹ | 101,520,000 ⁴⁰ | 244,107,000 ⁴¹ | 56,718,000 ⁴² |
| AP2 revised scheme material and waste arisings 2017 to 2025 | 1,886 | 943 | 1,886 | 943 |
| Future baseline waste arisings 2017 to 2025 with the AP2 revised scheme | 431,353,886 | 101,520,943 | 244,108,886 | 56,718,943 |
| Increase in future baseline waste arisings with the AP2 revised scheme | 0.0004% | 0.0009% | 0.0008% | 0.0017% |
| Future baseline waste arisings 2017 to 2025 with the original scheme | 431,353,917 | 101,520,959 | 244,108,917 | 56,718,959 |

³⁸ Based on future baseline C&I waste arisings and C&I waste to landfill for the aggregated five regions.

³⁹ Based on an annual projection of 47,928,000 tonnes nationally as set out in the main ES, Volume 3, Section 14.5.

⁴⁰ Based on an annual projection of 11,280,000 tonnes nationally as set out in the main ES, Volume 3, Section 14.5.

⁴¹ Based on an annual projection of 27,123,000 tonnes for the aggregated five regions as set out in the main ES, Volume 3, Section 14.5.

⁴² Based on an annual projection of 6,302,000 tonnes for the aggregated five regions as set out in the main ES, Volume 3, Section 14.5.

| | | | | |
|---|----------|----------|----------|----------|
| Increase in future baseline waste arisings with the original scheme | +0.0004% | +0.0010% | +0.0010% | +0.0020% |
|---|----------|----------|----------|----------|

19.6.44 Table 13 shows that the total quantity of worker accommodation site waste generated by the AP2 revised scheme will be equivalent to less than 0.1% of national and regional future baseline C&I waste arisings during the period 2017 to 2025. These represent negligible changes from the increases reported for the original scheme.

19.6.45 The total quantity of worker accommodation site waste that will require off-site disposal to landfill will be equivalent to less than 0.1% of national and regional future baseline C&I waste arisings to landfill during that time. These represent negligible changes from the increases reported for the original scheme.

Likely significant environmental effects

Inert waste landfill capacity

19.6.46 Subject to waste acceptance criteria set out in the Landfill Directive⁴³ and the Proposal for a Council Decision Establishing Criteria and Procedures for the Acceptance of Waste at Landfills⁴⁴, the total quantity of inert waste (i.e. surplus excavated material) that will require off-site disposal to landfill during the construction period 2017 to 2025 is approximately 11,311,251 tonnes (see Table 14). This represents an increase of 7,550,315 tonnes over the quantity reported for the original scheme. Inert waste will account for approximately 89% of the total CDEW requiring off-site disposal to landfill.

Table 14: Quantity of waste requiring off-site disposal to inert waste landfill for the original scheme and AP2 revised scheme, 2017 to 2025

| Waste source | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme quantity |
|----------------------------|---|--|---|
| Excavation | 3,760,937 | 11,311,251 | 100% |
| Demolition | 0 | 0 | 0% |
| Construction | 0 | 0 | 0% |
| Worker accommodation sites | 0 | 0 | 0% |
| Total | 3,760,937 | 11,311,251 | 100% |

19.6.47 Off-site disposal of inert surplus excavated material to landfill will result in an overall reduction of inert waste landfill capacity of 11,311,251 tonnes throughout the nine-year construction period.

⁴³ Council of the European Union; *Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste*; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0031:EN:NOT>; Accessed 6 May 2015.

⁴⁴ Commission of the European Communities; *Proposal for a Council Decision Establishing Criteria and Procedures for the Acceptance of Waste at Landfills Pursuant to Article 16 and Annex II of Directive 1999/31/EC on the Landfill of Waste (COM/2002/0512 Final)*; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52002PC0512:EN:NOT>; Accessed 6 May 2015.

- 19.6.48 This will be equivalent to a 9% reduction in inert waste landfill capacity across the aggregated five regions according to the amount of capacity projected to be available at the end of construction in 2025 (approximately 119 million tonnes)⁴⁵.
- 19.6.49 Further to this, Table 15 shows that the majority (approximately 96%) of inert surplus excavated material will be disposed off-site to inert waste landfill in the South East.

Table 15: Locations (by regional and local area) for the off-site disposal to landfill of inert surplus excavated material, 2017 to 2025

| Regional area for off-site disposal to landfill | Local area for off-site disposal to landfill | Quantity (tonnes) | Proportion |
|---|--|-------------------|------------|
| Greater London | N/A | 0 | 0% |
| South East | Surrey, Buckinghamshire | 10,881,205 | 96% |
| East of England | Hertfordshire | 0 | 0% |
| East Midlands | Northamptonshire | 430,046 | 4% |
| West Midlands | Warwickshire | 0 | 0% |
| Total | - | 11,311,251 | 100% |

- 19.6.50 On this basis, it is considered that there will be sufficient inert waste landfill capacity available in the aggregated five regions to accept the forecast quantity of inert surplus excavated material for off-site disposal to landfill.
- 19.6.51 Furthermore, the draw-down of inert waste landfill capacity as a result of the AP2 revised scheme will occur over a period of several years, starting initially with enabling works followed by earthworks such as tunnelling. It is unlikely that the AP2 revised scheme will draw-down projected capacity to an extent where there is an immediate, significant need for additional inert waste landfill capacity to be made available in the aggregated five regions.
- 19.6.52 A constant rate of surplus excavated material generation has been assumed for the five year period of the earthworks construction phase instead of the entire nine year construction phase assumed in Volume 3 of the main ES. The total quantity of inert surplus excavated material requiring off-site disposal to landfill will be approximately 2,262,250 tonnes per annum. This constitutes an increase of 1,844,368 tonnes over the quantity reported for the original scheme (i.e. 417,882 tonnes per annum).
- 19.6.53 Significance criteria for inert waste landfill capacity, appended to Section 16 of the SMR Addendum (Volume 5: Appendix CT-001-000/2)⁴⁶, state that a regional-scale reduction in inert waste landfill capacity of between 2,000,000 to 10,000,000 tonnes per annum may be judged to be important in the regional planning context, for example, where effects are permanent or long-term and the effect on local waste treatment and disposal infrastructure is such that additional capacity may be required.

⁴⁵ (Section 19.4 shows that by the end of the construction period in 2025, there will be approximately 119 million tonnes of inert waste landfill capacity remaining in the aggregated five regions through which the AP2 revised scheme will pass.

⁴⁶ Rationale for landfill significance criteria technical note appended to Section 16 of the SMR Addendum (Volume 5: Appendix CT-001-000/2).

- 19.6.54 In accordance with these significance criteria, the likely significant environmental effects associated with the off-site disposal to landfill of inert surplus excavated material generated by construction of the AP2 revised scheme increases to moderate adverse, compared to a minor adverse assessment for the original scheme in Volume 3 of the main ES.

Non-hazardous waste landfill capacity

- 19.6.55 Subject to waste acceptance criteria set out in the Landfill Directive⁴⁷ and the Proposal for a Council Decision Establishing Criteria and Procedures for the Acceptance of Waste at Landfills, the total quantity of non-hazardous waste that will require off-site disposal to landfill during the construction period 2017 to 2025 is approximately 830,454 (see Table 16). This represents an increase of 66,279 tonnes (8.6%) over the quantity reported for the original scheme in Volume 3 of the main ES.
- 19.6.56 The majority (approximately 53%) will comprise of surplus excavated material of Unacceptable Class U1B material. Other quantities of non-hazardous waste will be generated by demolition and construction activities and by occupants of worker accommodation sites.

Table 16: Quantity of waste requiring off-site disposal to non-hazardous waste landfill for the original scheme and combined AP2 revised scheme, 2017 to 2025

| Waste source | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme quantity |
|----------------------------|---|--|---|
| Excavation | 394,329 | 439,498 | 53% |
| Demolition | 96,105 | 101,808 | 12% |
| Construction | 272,782 | 288,205 | 35% |
| Worker accommodation sites | 959 | 943 | 0% |
| Total | 764,175 | 830,454 | 100% |

- 19.6.57 Off-site disposal of non-hazardous surplus excavated material, demolition, construction and worker accommodation site waste will result in an overall reduction of non-hazardous waste landfill capacity of 830,454 tonnes throughout the nine-year construction period of the original scheme.
- 19.6.58 This will be equivalent to a 1% reduction in non-hazardous waste landfill capacity across the aggregated five regions according to the amount of capacity projected to be available at the end of construction in 2025 (approximately 104 million tonnes).
- 19.6.59 On this basis, it is considered that there will be sufficient non-hazardous waste landfill capacity available in the aggregated five regions to accept the forecast quantity of

⁴⁷ Council of the European Union; Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0031:EN:NOT>; Accessed 6 May 2015.

non-hazardous surplus excavated material, demolition, construction and worker accommodation site waste for off-site disposal to landfill.

- 19.6.60 Table 16 shows that non-hazardous waste will be generated by a range of construction activities that will occur throughout the nine-year duration of construction of the AP2 revised scheme. As such, the nine-year period will be assumed in this case instead of the five-year period assumed for inert waste landfill capacity assessed above.
- 19.6.61 Consequently, the draw-down of non-hazardous waste landfill capacity as a result of the AP2 revised scheme will occur over a period of several years and is unlikely to draw-down projected capacity to an extent where there is an immediate, significant need for additional non-hazardous waste landfill capacity to be made available in these areas.
- 19.6.62 Assuming a fairly constant rate of waste generation throughout the nine-year construction period, the total quantity of non-hazardous waste requiring off-site disposal to landfill will be approximately 92,273 tonnes per annum, an increase of approximately 9% over the quantity reported for the original scheme.
- 19.6.63 Significance criteria for non-hazardous waste landfill capacity, which is appended to Section 16 of the SMR Addendum (Volume 5: Appendix CT-001-000/2)⁴⁸, state that a regional-scale reduction in non-hazardous waste landfill capacity of between 50,000 tonnes and 250,000 tonnes per annum may be judged to be important in the regional planning context.
- 19.6.64 According to the significance criteria applicable to non-hazardous waste landfill capacity, the likely significant environmental effects associated with the off-site disposal to landfill of non-hazardous surplus excavated material, construction, demolition and worker accommodation site waste generated by the AP2 revised scheme, remain unchanged from the assessment of the original scheme, and will be moderate adverse.

Hazardous waste landfill capacity

- 19.6.65 Subject to waste acceptance criteria set out in the Landfill Directive⁴⁹ and the *Proposal for a Council Decision Establishing Criteria and Procedures for the Acceptance of Waste at Landfills*⁵⁰, the total quantity of hazardous waste requiring off-site disposal to landfill during the construction period 2017 to 2025 is approximately 537,409 tonnes (see Table 17). This represents an increase of 136,048 tonnes (33.9%) over the quantity reported for the original scheme.

⁴⁸ Rationale for landfill significance criteria technical note appended to Section 16 of the SMR Addendum (Volume 5: Appendix CT-001-000/2).

⁴⁹ Council of the European Union; *Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste*; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0031:EN:NOT>; Accessed 6 May 2015.

⁵⁰ Commission of the European Communities; *Proposal for a Council Decision Establishing Criteria and Procedures for the Acceptance of Waste at Landfills Pursuant to Article 16 and Annex II of Directive 1999/31/EC on the Landfill of Waste (COM/2002/0512 Final)*; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52002PC0512:EN:NOT>; Accessed 6 May 2015.

SES and AP2 ES Volume 3 - Route-wide effects

Table 17: Quantity of waste requiring off-site disposal to hazardous waste landfill for the original scheme and AP2 revised scheme, 2017 to 2025

| Waste source | Total quantity original scheme (tonnes) | Total quantity AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme quantity |
|----------------------------|---|--|---|
| Excavation | 337,291 | 469,537 | 87% |
| Demolition | 64,070 | 67,872 | 13% |
| Construction | 0 | 0 | 0% |
| Worker accommodation sites | 0 | 0 | 0% |
| Total | 401,361 | 537,409 | 100% |

- 19.6.66 Off-site disposal of hazardous surplus excavated material and demolition waste will result in an overall reduction of hazardous waste landfill capacity of 537,409 tonnes throughout the nine-year construction period of the original scheme.
- 19.6.67 This will be equivalent to a 49% reduction in hazardous waste landfill capacity across the aggregated five regions according to the amount of capacity projected to be available at the end of construction in 2025 (approximately 1.1 million tonnes).
- 19.6.68 Table 17 shows that the majority (approximately 87%) of the hazardous waste landfill capacity requirement will be for hazardous surplus excavated material (i.e. Unacceptable Material Class U2) requiring off-site disposal to landfill (approximately 469,537 tonnes).
- 19.6.69 As a conservative assumption, this will be generated predominantly within the first two years of construction (i.e. 2017 and 2018) associated with excavation and management of contaminated land, and will thus be equivalent to a 25% reduction in hazardous waste landfill capacity across the aggregated five regions according to the amount of capacity projected to be available at the end of 2018 (approximately 1.9 million tonnes).
- 19.6.70 Hazardous surplus excavated material will be generated predominantly in the South East (approximately 306,214 tonnes, or 65% of all hazardous surplus excavated material generated)⁵¹ and the West Midlands (approximately 114,537 tonnes, or 24% of all hazardous surplus excavated material generated)⁵², where the majority of hazardous waste landfill capacity is projected to be available.
- 19.6.71 Significance criteria for hazardous waste landfill capacity, which is appended to Section 16 of the SMR Addendum (Volume 5: Appendix CT-001-000/2)⁵³, state that a regional-scale reduction in hazardous waste landfill capacity of between 20,000

⁵¹ 164,639 at HEx depot Langley off-route, 22,163 tonnes in CFA11 (Stoke Mandeville and Aylesbury), 14,772 tonnes in CFA13 (Calvert, Steeple Claydon, Twyford and Chetwode) and 104,640 tonnes in CFA14 (Newton Purcell to Brackley - South East region only).

⁵² 1,593 tonnes in CFA23 (Balsall Common and Hampden-in-Arden), 2,372 tonnes in CFA 24 (Birmingham Interchange and Chelmsley Wood), 2,126 tonnes in CFA25 (Castle Bromwich and Bromford) and 108,445 tonnes in CFA 26 (Washwood Heath to Curzon Street).

⁵³ Rationale for landfill significance criteria technical note appended to Section 16 of the SMR Addendum (Volume 5: Appendix CT-001-000/2).

tonnes and 100,000 tonnes per annum may be judged to be important in the regional planning context.

- 19.6.72 According to the significance criteria applicable to hazardous waste landfill capacity, the likely significant environmental effects associated with the off-site disposal to landfill of hazardous surplus excavated material and demolition waste generated by the AP2 revised scheme, remain unchanged from the assessment of the original scheme, and will be major adverse.

Other mitigation measures

- 19.6.73 The other mitigation measures described in Volume 3 of the main ES remain applicable to the AP2 revised scheme.
- 19.6.74 As shown in Table 18, excavation and earthworks activities will be responsible for the majority (97%) of waste requiring off-site disposal to landfill. Of this quantity, approximately 11,311,251 tonnes (or 93% of the total quantity of surplus excavated material requiring off-site disposal to landfill - see Table 6) will be inert in nature. This represents the greatest opportunity for further diversion from landfill through provision for use in other construction projects.
- 19.6.75 Work is being undertaken to identify opportunities for the beneficial off-site reuse of surplus excavated material (e.g. flood protection schemes) with the aim of achieving a landfill diversion rate of 90% for excavated material.

Table 18: Quantity of waste for off-site disposal to landfill by waste type for the original scheme and AP2 revised scheme, 2017 to 2025

| Waste source | Quantity for off-site disposal to landfill original scheme (tonnes) | Quantity for off-site disposal to landfill AP2 revised scheme (tonnes) | Proportion of AP2 revised scheme quantity |
|----------------------------|---|--|---|
| Excavation | 4,492,557 | 12,220,286 | 97% |
| Demolition | 160,175 | 169,679 | 1% |
| Construction | 272,782 | 288,205 | 2% |
| Worker accommodation sites | 959 | 943 | 0% |
| Total | 4,926,473 | 12,679,114 | 100% |

- 19.6.76 In some local areas along the route of the AP2 revised scheme⁵⁴, the use of inert surplus excavated material is also favoured by waste planning authorities for restoration purposes, for example, to restore landfill sites and former mineral workings. Whilst still classed as a landfill disposal activity, this is likely to provide further opportunities for the off-site management of inert surplus excavated material.

⁵⁴ For example, Policy 1.3 (Construction, Demolition and Excavation Waste) of the *Staffordshire and Stoke-on-Trent Local Waste Plan 2010-2026* favours the use of inert waste for restoration purposes.

- 19.6.77 Some of the non-hazardous waste generated by the construction of the AP2 revised scheme will also be suitable for energy recovery (i.e. incineration). This will reduce reliance on non-hazardous waste landfill capacity.
- 19.6.78 A reasonable worst-case approach has been taken in determining the quantity of hazardous waste for off-site disposal to landfill. However, detailed chemical sampling and laboratory analysis, as part of future ground investigation works, may allow the hazardous waste to be reclassified as non-hazardous waste. This will reduce reliance on hazardous waste landfill capacity.
- 19.6.79 It is likely that a large proportion of the hazardous demolition waste and hazardous surplus excavated material will comprise asbestos containing materials. This material could be disposed of at non-hazardous landfill sites within a separate cell for Stable Non-Reactive Hazardous Waste (SNRHW)⁵⁵ provided it meets SNRHW waste acceptance criteria in accordance with the Landfill Directive⁵⁶ and the Proposal for a Council Decision Establishing Criteria and Procedures for the Acceptance of Waste at Landfills. This will reduce reliance on hazardous waste landfill capacity.

Summary of likely residual significant effects

- 19.6.80 On the basis of the other mitigation measures proposed, the likely residual significant effects from construction will be:
- minor adverse in relation to inert waste landfill capacity;
 - moderate adverse in relation to non-hazardous waste landfill capacity; and
 - moderate adverse in relation to hazardous waste landfill capacity.

Cumulative effects

General

- 19.6.81 A qualitative assessment has been undertaken to establish the cumulative effects associated with the off-site disposal to landfill of solid waste that will be generated by the construction of the AP2 revised scheme and other developments along its route.
- 19.6.82 The cumulative effects assessment takes into account developments that are assumed to be delivered at the same time as the construction of the AP2 revised scheme (i.e. 2017 to 2025), thus they will have a simultaneous requirement for landfill disposal capacity of solid waste. A list of developments that have been taken into account in the cumulative effects assessment is provided in Appendix WM-002-000 (Volume 5).
- 19.6.83 The majority of the committed developments are of insufficient scale to result in significant cumulative effects. However, there are three developments identified which are of potential significance in terms of activities and scale.

⁵⁵ A non-hazardous waste landfill with a SNRHW cell allows for hazardous waste that has been stabilised and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes and in accordance with Council Decision 2003/33/EC (Council Decision of 19 December 2002 Establishing Criteria and Procedures for the Acceptance of Waste at Landfills Pursuant to Article 16 of Annex II to Directive 1999/31/EC). For further details, see Environment Agency; *Waste Acceptance at Landfills: Guidance on Waste Acceptance Procedures and Criteria*, November 2010; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296422/geho1110btew-e-e.pdf; Accessed 6 May 2015.

⁵⁶ Council of the European Union; *Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste*; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0031:EN:NOT>; Accessed 6 May 2015.

Thames Tideway Tunnel

- 19.6.84 The Thames Tideway Tunnel development comprises of a wastewater storage and transfer tunnel between the operational Thames Water sites at Acton Storm Tanks and the Abbey Mills Pumping Station. On 12 September 2014, the UK Government formally granted the development consent order for the project.
- 19.6.85 The Thames Tideway Tunnel development is expected to generate approximately 4,704,000 tonnes of excavation arisings as stated in the Thames Water Utilities Ltd Excavated Materials Options Assessment (EMOA)⁵⁷. The construction programme shows that the majority of the excavated materials would be generated during the years when the main tunnel drives are in progress. According to the EMOA, the Thames Tideway Tunnel development would generate 1,938,000 tonnes of excavated materials in 2018 and 1,852,000 tonnes in 2019 respectively.
- 19.6.86 The generation of excavated material overlaps with the off-site disposal of surplus excavated material from the AP2 revised scheme in 2019, at a point in the construction programme where the AP2 revised scheme waste generation rate is gradually increasing.

Crossrail 1

- 19.6.87 The Crossrail 1 development comprises of a new rail line passing through London from Maidenhead in the west to Shenfield in the east. Changes to the programme have introduced the potential for the development to be considered a cumulative development.
- 19.6.88 Construction of the Crossrail 1 development is underway and continues to generate CDEW. The construction programme shows that tunnelling works will be completed by 2015, with work on all stations, portals and shafts to be completed by the first quarter of 2018.
- 19.6.89 The majority of CDEW requiring off-site disposal from the AP2 revised scheme will be generated after the construction of Crossrail is complete.

Northern Line Extension

- 19.6.90 The Northern Line Extension development comprises a 3.2km extension of the Charing Cross Branch of the Northern Line from Kennington to a new station at the site of the Battersea Power Station, with an intermediate station at Nine Elms.
- 19.6.91 The current construction programme for the Northern Line Extension development shows the main tunnelling works to be completed by 2017, with only the station fit out extending into 2018. In 2019, the first year of significant waste generation from the AP2 revised scheme, the Northern Line Extension development will be in the testing and commissioning phases.

Cumulative assessment

- 19.6.92 Considering the potential for waste generation, opportunities to divert waste from landfill and the amount of inert, non-hazardous and hazardous waste landfill capacity projected to be available in the aggregated five regions at the end of construction in

⁵⁷ Thames Water Utilities Limited (September 2013), Thames Tideway Tunnel - Excavated Materials Options Assessment; <http://infrastructure.planningportal.gov.uk/document/2030207>; Accessed 27 May 2015

2025⁵⁸, it has been assessed that the cumulative effects, without mitigation measures applied to the major schemes identified, are as set out below and as for those in the main AP2 ES assessment:

- moderate in relation to inert waste landfill capacity;
- moderate adverse in relation to non-hazardous waste landfill capacity; and
- major adverse in relation to hazardous waste landfill capacity.

19.6.93 Mitigation measures provided for these major schemes will reduce the magnitude of the cumulative effects.

19.7 Assessment of effects during operation

19.7.1 The operation of the AP2 revised scheme will not give rise to new or different significant environmental route-wide effects during operation⁵⁹.

⁵⁸ Approximately 119 million tonnes of inert waste landfill, 105 million tonnes of non-hazardous waste landfill and 1.1 million tonnes of hazardous landfill.

⁵⁹ The removal of the HS1-HS2 link is included in the forecast balance of excavated material quantities. Updates to the waste and material resources topic relating to operational waste as a result of the removal of the HS1-HS2 link will be reported in a future ES.

20 Water resources and flood risk assessment

20.1 Introduction

- 20.1.1 Volume 3 of the main ES presented the significant route-wide effects on surface water and groundwater resources and flood risk, including an assessment of compliance with the WFD. It concluded that, with the exception of the Mid-Chilterns Chalk groundwater body, there are no likely significant regional or route-wide, temporary or permanent adverse effects on water resources and flood risk as a result of the construction process or the operation and maintenance of the original scheme.
- 20.1.2 The water resources and flood risk topic was scoped out of Volume 3 of the AP1 ES as the AP1 amendments were not considered likely to have potential to generate new or different significant environmental route-wide effects with regard to water resources and flood risk.
- 20.1.3 A scoping exercise was undertaken to determine whether any of the proposed amendments within the AP2 revised scheme would act in combination to lead to regional or route-wide effects on water resources or flood risk. This scoping exercise determined that, in terms of water resources and flood risk, the AP2 amendments were not material and did not have the potential to give rise to new or different route-wide significant effects. The focus of the AP2 revised scheme assessment has therefore been on potential changes to the risk of WFD compliance to surface water and ground water bodies.
- 20.1.4 WFD surveys have been undertaken since submission of the main ES for several of the waterbodies concluded within the main ES to be at amber (adverse widespread or prolonged potential effect) risk of a WFD breach. These surveys have facilitated an improved understanding of the baseline condition of some of the waterbodies potentially affected by the original scheme. A summary of survey work undertaken since September 2013 is provided in Volume 5: Appendix WR-001-000 Annex A Surface Water and Annex B Groundwater and Volume 5 map series WR-03.
- 20.1.5 WFD reassessment of the SES scheme was undertaken using the new survey baseline, and is reported in Section 10 of this document. The SES scheme assessment concluded that there would be no change to the main ES conclusion that whilst there are potential risks of deterioration, with further development of avoidance measures and generic mitigation through detailed design, there would be no breach in WFD objectives as a result of the SES scheme. The SES scheme assessment highlighted that, overall, there would be a reduction in the number of waterbodies at amber (adverse widespread or prolonged potential effect) risk, from 24 to 18, as a result of having greater detail on the baseline condition of waterbodies affected.
- 20.1.6 The AP2 revised scheme has been reassessed for WFD compliance to take account of the revised baseline information together with the AP2 amendments.

20.2 Changes to the assessment of effects

Change in potential risks to water body status

Surface water

- 20.2.1 There are 28 AP2 amendments that have the potential to affect 17 surface water bodies. 16 of these waterbodies would also potentially be affected by the SES scheme. The AP2 amendments therefore result in one additional surface water body potentially affected by the AP2 amendments that was not assessed as part of the SES scheme.
- 20.2.2 Of the 16 surface water bodies potentially affected by both the AP2 amendments as well as the SES scheme, 14 remain at the same overall level of risk as for the SES scheme (two at amber risk and 12 at yellow risk), whereas two (Bourne-Bilson Brook and the River Tame from River Anker to River Trent) have an increase from yellow (localised or temporary adverse potential effect) to amber risk when compared to the SES scheme due to possible adverse effects on fish.
- 20.2.3 The additional water body added to the assessment, the Horton Brook in the Colne catchment, is potentially affected by the new HEx depot, Langley (AP2-000-001). The Horton Brook was identified as being at amber risk of deterioration as a result of the effects on fish of the additional land required and changes to morphology associated with the proposed culvert.
- 20.2.4 The assessment of the AP2 revised scheme concluded that whilst there have been changes in the level of risk associated with deterioration for some surface water bodies when compared to the SES scheme and one additional waterbody is potentially affected, there is no overall change in the conclusion that there will be no breach in WFD objectives.

Groundwater

- 20.2.5 There are 10 AP2 amendments that have the potential to affect seven groundwater bodies. Six of these waterbodies were potentially affected by both the SES scheme, with one additional groundwater body potentially affected by the AP2 amendments.
- 20.2.6 There were no changes to the risks assessed for the six groundwater bodies potentially affected by the AP2 revised scheme as well as the SES scheme.
- 20.2.7 The additional groundwater body added to the assessment, the Lower Thames Gravels aquifer, is potentially affected by the new HEx depot, Langley (AP2-000-001). The potential risks are associated with the surface water and water balance WFD groundwater elements and constitute a localised/temporary adverse (yellow) risk of deterioration.
- 20.2.8 The assessment of the AP2 revised scheme concluded that there have been no changes in the level of risk associated with deterioration for groundwater bodies when compared to the SES scheme, and whilst there is an additional groundwater body at risk of deterioration, there is no overall change in the conclusion that there will be no breach in WFD objectives.

WFD compliance

- 20.2.9 As stated in Volume 3 in the main ES, the WFD assessment has been undertaken on a precautionary basis given that the baseline data was not available for all the affected water bodies and tributaries, and that the design of mitigation measures is at an outline stage.
- 20.2.10 The WFD assessment provides an indication of the likely compliance of the scheme at the time the assessment was prepared. It is based on the original scheme design, incorporated mitigation measures and on the current status of 61 surface water bodies and 16 groundwater bodies. The assessment assumes key avoidance and mitigation measures as presented in the main ES are in place such as, ensuring that engineering design retains an adequate 'buffer' around sites, habitats or features of ecological value, sufficient to ensure their continued ecological functionality (see Section 2.5 of Appendix RW-001-000 of the main ES for a full list).
- 20.2.11 The assessment concluded that, as for the original scheme, there will be no breach of the WFD.

21 Phase One and Phase Two combined impacts

21.1 Introduction

- 21.1.1 Volume 3 of the main ES presented a tabulated summary of the potential total impacts of both Phase One (the original scheme) and Phase Two on a range of environmental receptors. Impacts of the original scheme were based on design data and assessments undertaken as part of the EIA or assessments prepared in support of the January 2012 updated Appraisal of Sustainability report for Phase One. The Phase Two data was taken from the Phase Two Sustainability Statement, published in July 2013.
- 21.1.2 Volume 3 of the AP1 ES reported that the amendments would result in very minor or negligible changes to the figures given in Volume 3 of main ES. These amendments would not result in any material difference in relation to Phase One and Phase Two combined impacts.
- 21.1.3 No data is provided in Section 11 of this volume for the SES scheme as they similarly result in only very minor or negligible changes to the figures given in Volume 3 of the main ES.

21.2 Summary of changes to combined impacts

- 21.2.1 Table 19 presents a summary of the potential total impacts of Phase One (the original scheme and the AP2 revised scheme) and Phase Two on a range of environmental receptors. Impacts of the Phase One, original scheme, were based on design data and assessments undertaken as part of the main ES or assessments prepared in support of the January 2012 updated AoS Report for Phase One⁶⁰. The Phase One, AP2 revised scheme data is taken from the SES and AP2 ES. The Phase Two data is taken from the Phase Two Sustainability Statement⁶¹.

Table 19: Combined impacts of Phase One (original scheme and AP2 revised scheme) and Phase Two

| | Phase One original scheme | Phase One AP2 revised scheme | Phase Two total (Phase Two Manchester and Phase Two Leeds) | Overall Total (Phase One AP2 revised scheme and Phase Two total) |
|-----------------------------------|------------------------------|---------------------------------|---|---|
| Route characteristics (km) | | | | |
| Total | 225.5 ⁶² | 216.0 ⁶³ | 335.2 | 551.2 |
| At grade | 0.1 | 0 ⁶⁴ | 24.1 | 24.1 |
| Tunnel | 53.4 | 47.9 ⁶⁵ | 27.3 | 75.2 |

⁶⁰ Booz & Co. Temple (2012), High Speed 2 London to West Midlands Appraisal of Sustainability - Post Consultation Route Refinements.

⁶¹ Temple ERM (2013), High Speed Rail: Consultation on the route from the West Midlands to Manchester, Leeds and beyond Sustainability Statement Volume 1: main report of the Appraisal of Sustainability.

⁶² This total includes another 14.5km attributed to retaining walls and stations.

⁶³ This total includes another 13.1km attributed to retaining walls and stations. This total includes the removal of the HS1-HS2 link.

⁶⁴ This total includes the removal of the HS1-HS2 link.

SES and AP2 ES Volume 3 - Route-wide effects

| | Phase One original scheme | Phase One AP2 revised scheme | Phase Two total (Phase Two Manchester and Phase Two Leeds) | Overall Total (Phase One AP2 revised scheme and Phase Two total) |
|---|--|--|---|---|
| Cutting | 73.8 | 76.0 ⁶⁶ | 130.9 | 206.9 |
| Viaduct | 18.5 | 16.4 ⁶⁷ | 47.0 | 63.4 |
| Embankment | 65.2 | 62.6 ⁶⁸ | 105.9 | 168.5 |
| Property and settlements | | | | |
| Demolitions (residential) | 339 dwellings ^{69, 70} (265 buildings) | 335 dwellings (248 buildings) | 278 | 613 |
| Demolitions ⁷¹ (community) | 21 community facilities ⁷² | 21 ⁷³ community facilities | 4 | 25 |
| Demolitions (commercial/ retail) | 404 units (312 buildings) ⁷⁴ | 408 units (312 buildings) | 227 | 646 |
| Demolitions (manufacturing/ industrial) | | | 11 | |
| Total demolitions (including residential) | 600 buildings ^{75, 76} | 582 buildings | 520 | 1,102 |
| Employment and housing | | | | |
| Permanent jobs created | 2,200 ⁷⁷ | 2,200 | 1,400 | 3,100 ⁷⁸ |
| Construction jobs created | 14,600 ⁷⁹ | 14,600 | 10,000 | 24,600 |
| Jobs supported ⁸⁰ | 30,000 ⁸¹ | 30,000 | 48,700-70,300 | 78,700-100,300 |

⁶⁵ This total includes the removal of the HS1-HS2 link.

⁶⁶ This total includes the removal of the HS1-HS2 link.

⁶⁷ This total includes the removal of the HS1-HS2 link.

⁶⁸ This total includes the removal of the HS1-HS2 link.

⁶⁹ This figure excludes student accommodation at Curzon Street on the basis that this is a commercially operated business for short term lets (and is included as two buildings under commercial/retail demolitions).

⁷⁰ This figure excludes future baseline (i.e. committed residential development not currently completed).

⁷¹ This total includes the community facilities that are demolished and not re-provided.

⁷² This figure is provided for the number of community resources (i.e. a cluster of buildings providing a single resource is reported as a single demolition). This figure does not include the demolition of buildings which will not prevent the continued operation of a community resource (e.g. outbuildings or other ancillary structures), however these are included under total demolitions.

⁷³ Two community facilities are being re-provided: Burton Green Community Hall and Wendover Cricket Ground.

⁷⁴ This figure includes some properties which also provide community resources, e.g. public house, local services.

⁷⁵ This total includes the total number of residential, community, commercial/retail/manufacturing/industrial & miscellaneous buildings.

⁷⁶ This number is different to that published in the Phase Two Sustainability Statement (which was based on data in the Draft Environmental Statement) as there have been some changes to the design and more detailed knowledge of other buildings not previously referenced (e.g. outbuildings).

⁷⁷ Indicative direct operational employment figure which has been estimated to the nearest 100 jobs.

⁷⁸ Figures are not additive as some jobs associated with classic compatible services for Phase One will transfer to Phase Two.

⁷⁹ Number reported as an approximate equivalent of permanent full time construction jobs.

⁸⁰ Figures account for jobs displaced.

SES and AP2 ES Volume 3 - Route-wide effects

| | Phase One original scheme | Phase One AP2 revised scheme | Phase Two total (Phase Two Manchester and Phase Two Leeds) | Overall Total (Phase One AP2 revised scheme and Phase Two total) |
|--|------------------------------|---------------------------------|---|---|
| Houses supported | 5,620 ⁸² | 5,620 | 5,200-7,600 | 10,820-13,200 |
| Jobs displaced | 8,430 ⁸³ | 8,510 ⁸⁴ | 4,800 | 13,310 |
| Noise | | | | |
| People affected by noise (WebTAG annoyance) (mitigated scheme) | ~525 ⁸⁵ | ~525 ⁸⁶ | ~1,600 ⁸⁷ | ~2,125 |
| People affected by noise (WebTAG annoyance) per km | ~2.3 | ~2.3 | ~4.8 | ~3.8 |
| Landscape | | | | |
| AONB crossed at surface (km) | 8.9 | 8.9 | 0 | 8.9 |
| Cultural heritage | | | | |
| Scheduled Monuments directly affected | 1 | 1 | 1 | 2 |
| Registered Battlefields directly affected | 1 | 1 | 0 | 1 |
| Grade I & II* structures directly affected | 1 ⁸⁸ | 1 | 0 | 1 |
| Grade II structures directly affected | 18 | 18 | 8 | 26 |
| Registered parks and gardens directly affected | 2 | 2 | 0 | 2 |
| Conservation Areas directly affected | 2 | 2 | 8 | 10 |
| Biodiversity and wildlife | | | | |
| Natura 2000 sites | 0 | 0 | 0 | 0 |

⁸¹ Booz & Co. Temple (2012), *High Speed 2 London to West Midlands Appraisal of Sustainability - Post Consultation Route Refinements*.

⁸² Booz & Co. Temple (2012), *High Speed 2 London to West Midlands Appraisal of Sustainability - Post Consultation Route Refinements*.

⁸³ Jobs displaced comprise jobs relocated elsewhere in the UK economy and jobs lost, due to land being acquired for the construction and operation of the original scheme.

⁸⁴ Jobs displaced comprise jobs relocated elsewhere in the UK economy and jobs lost, due to land being acquired for the construction and operation of the AP2 revised scheme.

⁸⁵ Methodology used is consistent with that used in the Phase Two Sustainability Statement, July 2013.

⁸⁶ Methodology used is consistent with that used in the Phase Two Sustainability Statement, July 2013.

⁸⁷ Figure rounded in Phase Two Sustainability Statement, July 2013.

⁸⁸ This comprises the alteration to a curtilage wall to a Grade 1 Listed building.

SES and AP2 ES Volume 3 - Route-wide effects

| | Phase One original scheme | Phase One AP2 revised scheme | Phase Two total (Phase Two Manchester and Phase Two Leeds) | Overall Total (Phase One AP2 revised scheme and Phase Two total) |
|--|------------------------------|---------------------------------|---|---|
| affected | | | | |
| SSSIs directly affected | 2 | 2 | 13 | 3 |
| Habitats of Principal Importance directly affected | 41 | 41 | 62 | 103 |
| Ancient Woodlands directly affected | 26 ⁸⁹ | 26 ⁹⁰ | 14 | 40 |
| Water resources and flood risk | | | | |
| Major rivers diverted | 7 | 8 ⁹¹ | 5 | 13 |
| Route through Flood Zone 3 (km) | 12.0 | 12.0 | 28.5 | 40.5 |
| Station/depot occupation of Flood Zone 3 (ha) | 2.1 | 2.1 | 23.6 | 25.7 |
| Cutting or tunnel through SPZ 1 or 2 (km) | 8.1 | 8.1 | 1.7 | 9.8 |
| Land use resources | | | | |
| Active landfills crossed | 0 | 0 | 5 | 5 |
| Grade 1 and 2 agricultural land (km) | 22.0 | 22.0 | 50.8 | 72.8 |
| Waste and material resources | | | | |
| Excavated material (million m ³) | 62.2 ⁹² | 62.4 | 29.00 | 91.4 |
| Concrete (million tonnes) | 13.62 | 13.04 ⁹³ | 6.77 | 19.81 |
| Steel (million tonnes) | 1.36 | 1.30 ⁹⁴ | 0.73 | 2.03 |

⁸⁹ In Table 42 in Volume 3 of the main ES, 19 sites were identified to be directly affected by the original scheme. Since publication of the main ES, four additional woodlands have been added to the ancient woodland inventory and three additional sites have been identified that were previously considered as a single ancient woodland area. This results in a total of 26 ancient woodlands sites identified to be directly affected by the original scheme (refer to Section 5.2.6 and 5.2.7 in this report).

⁹⁰ A further 11 sites are likely to be added to the ancient woodland inventory.

⁹¹ The additional river diverted as a result of the AP2 revised scheme from the original scheme is Mare Brook.

⁹² This figure is the total quantity of excavated material that will be generated from the construction of Phase One. This includes excavated material that will be reused in the construction process as well as surplus excavated material that will be made available for use off-site or disposed of on or off-site.

⁹³ This total reflects the reduced length of the AP2 scheme as a pro-rata of the original scheme.

⁹⁴ This total reflects the reduced length of the AP2 scheme as a pro-rata of the original scheme.

22 References

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X55