

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 4 and Additional Provision 5 Environmental Statement

- Volume 1 | Introduction and methodology
- Volume 2 | Community forum area reports
- Volume 3 | Route-wide effects
- Glossary of terms and list of abbreviations

December 2015

SES4 and AP5 ES 3.1.1



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Volume 1 | Introduction and methodology

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Department for Transport

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HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 4 and
Additional Provision 5 Environmental Statement
Volume 1 | Introduction and methodology

December 2015

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Preface

This supplementary environmental information is being deposited as supplementary information under Private Business Standing Order 224A of the House of Commons and Standing Order 83A of the House of Lords (Comments on environmental statement).

Structure of the HS₂ Supplementary Environmental Statement ₄ and the Additional Provision ₅ Environmental Statement

The Supplementary Environmental Statement ₄ (SES₄) and the Additional Provision ₅ (AP₅ ES) are separate documents. However, they are bound together and presented in a combined volume. The SES₄ and the AP₅ ES comprise:

- Non-technical summary (NTS): this provides a summary in non-technical language of the SES₄ (Part 1) and AP₅ 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') as updated by subsequent SES and AP ES documents;
- Volume 1: introduction to the SES₄ and AP₅ ES. This introduces the design changes included within the SES₄, and the amendments which have resulted in the need to amend the Bill, within the AP₅ ES. The report explains the scope, methodology, assumptions and limitations of the environmental assessment, and approach to consultation;
- Volume 2: community forum area (CFA) reports and map book. These describe the design changes included within the SES₄ (Part 1) and the amendments within the AP₅ ES (Part 2). Any new or different likely significant environmental effects arising from these changes and amendments in each CFA, compared to those reported in the main ES, as updated by the SES, SES₂ and SES₃ documents (and SES₄ for the AP₅ amendments) are reported. The AP₁, AP₂, AP₃ and AP₄ amendments are also taken into account where relevant;
- Volume 3: route-wide effects. This reports new or different likely significant route-wide effects arising from the design changes included within the SES₄ (Part 1) and the amendments within the AP₅ ES (Part 2) compared to those reported in the main ES as updated by SES, SES₂ and SES₃ (and SES₄ for the AP₅ amendments). The AP₁, AP₂, AP₃ and AP₄ amendments are also taken into account where relevant;
- Volume 5: appendices and map book. This contains environmental information and associated maps in support of the other volumes of the SES₄ and AP₅ ES; and
- glossary of terms and list of abbreviations. This contains any new or different

terms and abbreviations used throughout the SES and AP ES reports, additional to those included in the main ES.

There are no off-route design changes included within the SES₄ or amendments within the AP₅ ES, so no Volume 4 has been prepared.

For CFA₂₂ (Whittington to Handsacre), the changes brought forward by AP₂ were substantial, and included changes to both the vertical and horizontal alignment of the HS₂ route. The scale of the amendments was such that the Volume 2 report was rewritten in its entirety, effectively replacing the CFA₂₂ (Whittington to Handsacre) Volume 2 document prepared for the main ES. There are no SES₄ changes in CFA₂₂ (Whittington to Handsacre).

For CFA₂₂ (Whittington to Handsacre) therefore, the AP₅ ES provides an assessment of any new or different likely significant environmental effects arising from the amendment compared to the AP₂ revised scheme, as updated by the SES₃ scheme, as it is assumed that the AP₅ amendment will only proceed in the event that the AP₂ amendments are enacted.

Structure of this report

The remainder of this report is structured as follows:

- Section 1: Introduction;
- Section 2: Introduction to the SES₄ and the AP₅ ES;
- Section 3: Scope and methodology of the SES₄ and the AP₅ ES;
- Section 4: Approach to the appendices in the SES₄ and the AP₅ ES;
- Section 5: Approach to mapping in the SES₄ and the AP₅ ES;
- Section 6: Approach to the construction programme and construction methods;
- Section 7: Approach to mitigation associated with the SES₄ and the AP₅ ES; and
- Section 8: Consultation on the SES₄ and the AP₅ ES.

1 Introduction

1.1 Background to High Speed Two

1.1.1 The Bill for high speed rail between London and the West Midlands 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 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 report.

1.1.2 Since the deposit of the Bill, the need for a number of amendments (i.e. changes that require amendments to the Bill) to the scheme have been identified. These have been promoted in Parliament through the following four APs, which were each accompanied by an ES:

- AP1: deposited in Parliament in September 2014. This focused on CFAs 7 (Colne Valley) to 26 (Washwood Heath to Curzon Street);
- AP2: deposited in Parliament in July 2015. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street);
- AP3: deposited in Parliament in September 2015. This focused on CFAs 1 (Euston station and approach) to 3 (Primrose Hill to Kilburn (Camden)); and
- AP4: deposited in Parliament in November 2015. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street).

1.1.3 A number of other changes to the design, which do not require amendments to the Bill, have also been made. Any new or different significant effects that were likely to result from such changes as well as from changes to construction assumptions, new environmental baseline information, and corrections to the main ES were reported in the following SESs:

- SES: submitted alongside the AP2 ES. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street);
- SES2: submitted alongside the AP3 ES. This focused on CFAs 1 (Euston station and approach) to 5 (Northolt Corridor); and
- SES3: submitted alongside the AP4 ES. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street).

1.1.4 Since submission of the SES3 and AP4 ES, the need for a number of further amendments has been identified in the following CFAs:

- CFA6 (South Ruislip to Ickenham);
- CFA7 (Colne Valley);

- CFA₁₁ (Stoke Mandeville and Aylesbury);
- CFA₁₂ (Waddesdon and Quainton);
- CFA₁₅ (Greatworth to Lower Boddington);
- CFA₂₀ (Curdworth to Middleton);
- CFA₂₁ (Drayton Bassett, Hints and Weeford);
- CFA₂₂ (Whittington to Handsacre); and
- CFA₂₄ (Birmingham Interchange and Chelmsley Wood).

- 1.1.5 These amendments include additional land required for generally minor works. These amendments are being promoted through AP₅. The associated AP₅ ES describes these amendments and reports the associated likely significant environmental effects.
- 1.1.6 There are two design changes in CFAs 10 (Dunsmore, Wendover and Halton) and 13 (Calvert, Steeple Claydon, Twyford and Chetwode) that do not require amendments to the Bill, and a correction to the main ES in CFA₁₁ (Stoke Mandeville and Aylesbury). Any new or different likely significant effects that are likely to result from these changes are reported in a fourth SES ('SES₄').
- 1.1.7 These additional amendments and design changes have arisen through the High Speed Rail (London – West Midlands) Bill Select Committee ('the Select Committee') process, and ongoing discussions with petitioners and key stakeholders including utility undertakers.
- 1.1.8 Table 1 lists each of the CFAs, illustrating which have SES changes and AP amendments.

SES₄ and AP₅ ES Volume 1

Table 1: Table illustrating which CFAs have SES changes and AP amendments

CFA	AP ₁	SES	AP ₂	SES ₂	AP ₃	SES ₃	AP ₄	SES ₄	AP ₅
1				●	●				
2				●	●				
3				●	●				
4		●	●	●		●	●		
5		●	●	●			●		
6		●	●			●	●		●
7	●	●	●			●	●		●
8		●				●	●		
9	●	●	●			●	●		
10	●	●	●			●	●	●	
11	●	●	●			●	●	●	●
12	●	●	●			●	●		●
13	●	●	●			●	●	●	
14	●	●	●			●			
15	●	●	●			●	●		●
16	●	●	●			●	●		
17	●	●	●			●	●		
18	●	●	●			●	●		
19	●	●	●			●	●		
20	●	●	●			●	●		●
21	●	●	●						●
22	●	●	●			●	●		●
23		●	●			●	●		
24	●	●	●			●	●		●
25		●	●			●	●		
26	●	●	●			●	●		

- 1.1.9 A formal consultation will be undertaken on the SES₄ and the AP₅ ES. There will also be a petitioning period for those directly and specially affected by the changes. Any petitions against these changes will be heard by the Select Committee in due course.

1.2 Terminology used to describe the scheme

- 1.2.1 In order to differentiate between the original scheme assessed as part of the main ES and subsequent changes, the following terms in Table 2 are used throughout the SES₄ and the AP₅ ES.

Table 2: Scheme descriptions

Scheme name	Definition	Relevant CFAs
the original scheme	the Bill scheme submitted to Parliament in November 2013, which was assessed in the main ES	1 to 26
the AP ₁ revised scheme	the original scheme as amended by the AP submitted in September 2014	7 to 26 (excluding 8, 23 and 25)
the SES scheme	the original scheme with the design changes described in the SES submitted in July 2015	4 to 26

SES₄ and AP₅ ES Volume 1

Scheme name	Definition	Relevant CFAs
the AP ₂ revised scheme	the SES scheme as amended by the AP ₂ submitted in July 2015	4 to 26 (excluding 8)
the SES ₂ scheme	the original scheme as updated by the SES scheme, with the design changes described in the SES ₂ submitted in September 2015	1 to 5 (i.e. this applies in the London area only)
the AP ₃ revised scheme	the SES ₂ scheme as amended by the AP ₃ submitted in September 2015	1 to 3 (i.e. this applies in the London area only)
the SES ₃ scheme	the SES ₂ scheme with the design changes described in the SES ₃ submitted in October 2015	4 to 26 (excluding 5 and 21)
the AP ₄ revised scheme	the SES ₃ scheme as amended by the AP ₄ submitted in October 2015	4 to 26 (excluding 14 and 21)
the SES ₄ scheme	the SES ₃ scheme with design changes described in the SES ₄ submitted in December 2015	10 and 13
the AP ₅ revised scheme	the SES ₄ scheme as amended by the AP ₅ submitted in December 2015	6, 7, 11, 12, 15, 20, 21, 22 and 24

1.2.2 The following terms are also used to differentiate between design changes included in the SES₄ and those included in the AP₅ ES:

- 'SES₄ design changes' – changes to the scheme reported in the SES₄ that do not require amendments to the Bill; and
- 'AP₅ amendments' – changes to the scheme reported in the AP₅ ES that require amendments to the Bill.

2 Introduction to the SES₄ and the AP₅ ES

2.1 Introduction to the SES₄

2.1.1 The SES₄ presents an assessment of the new or different likely significant effects arising from the SES₄ changes compared to the SES₃ scheme, which forms the baseline for the assessment. Where relevant the assessment also reports the likely significant cumulative effects taking into account previous AP amendments.

2.1.2 The SES₄ changes include:

- changes to the design of the scheme that do not require amendments to the Bill. These are the provision of additional noise mitigation at Wendover and Chetwode, including an extension of the Wendover green tunnel southward by 100m and increasing the height and length of noise fence barriers; and
- a correction to the main ES.

2.2 Introduction to the AP₅ ES

2.2.1 The AP₅ ES reports any new or different likely significant environmental effects due to the amendments proposed in AP₅ compared to the SES₄ scheme, which forms the new baseline. Where relevant, the assessment also reports the likely significant cumulative effects taking into account previous AP amendments.

2.2.2 In some instances, an AP₅ amendment is reliant on land required for previous AP revised schemes. Where this occurs, it is assumed that the relevant previous AP amendment will be enacted, and therefore the total impact of the AP₅ amendment with the relevant previous AP amendment is assessed.

2.2.3 The AP₅ amendments are:

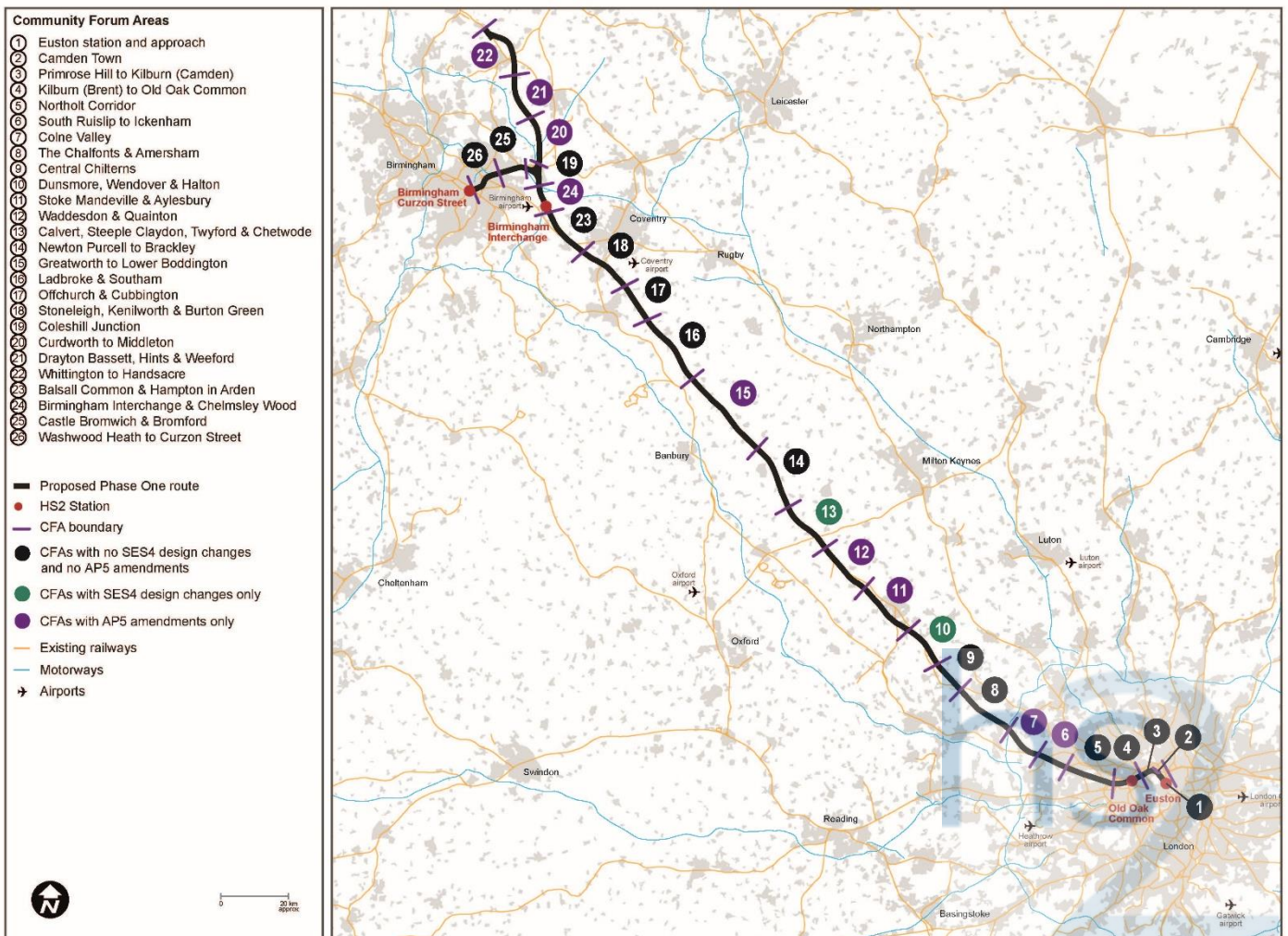
- car parking and access: additional land for replacement car parking, access road and security gatehouse at a pharmaceutical research facility in CFA6 (South Ruislip to Ickenham);
- utilities:
 - additional land for a temporary utility diversion between pylons located between Harvil Road and Breakspear Road North, in the London Borough of Hillingdon in CFA6 (South Ruislip to Ickenham) and CFA7 (Colne Valley);
 - additional land for a permanent overhead power line diversion at Hillingdon Quarry in CFA7 (Colne Valley);
 - additional land required temporarily for utility winching works near Aylesbury in CFA11 (Stoke Mandeville and Aylesbury), near Botolph Claydon and Grendon Underwood in CFA12 (Waddesdon and Quainton), West of Brockhurst Lane in CFA21 (Drayton Bassett, Hints and Weeford) and near Hanch Reservoir and north of Lichfield Golf Course in CFA22 (Whittington to Handsacre); and
 - additional land required for a gas main diversion at Gallows Brook, Middleton in CFA20 (Curdworth to Middleton) and CFA21 (Drayton Bassett, Hints and Weeford);

and

- public rights of way:
 - a reduction in length by 70m of the permanent diversion of Bridleway DEN/3 Ricks 002 near Denham in CFA7 (Colne Valley); and
 - a change to Footpath AN13 near Greatworth in CFA15 (Greatworth to Lower Boddington); and
- permanent scheme infrastructure:
 - additional land required for the upgrading of the A5 Hints Bridleway 4 overbridge to an accommodation overbridge to enable use by agricultural vehicles in CFA21 (Drayton Bassett, Hints and Weeford); and
 - additional land required for the realignment of the people mover between the Birmingham Airport and the National Exhibition Centre (NEC) people mover stops in CFA24 (Birmingham Interchange and Chelmsley Wood).

2.2.4 Figure 1 identifies the CFAs with and without SES4 design changes and AP5 amendments along the HS2 Phase One route.

Figure 1: Phase One route showing the community forum areas with and without SES4 design changes and AP5 amendments



3 Scope and methodology of the SES4 and the AP5 ES

3.1 Scope and methodology for the main ES and subsequent SESs and AP ESs

3.1.1 The HS2 Scope and Methodology Report (SMR) (main ES, Volume 5: Appendix CT-001-000/1) was published in September 2012 and set out the proposed scope and methodology for the Environmental Impact Assessment (EIA) of the scheme.

3.1.2 A first SMR Addendum (main ES, Volume 5: Appendix CT-001-000/2) was published in November 2013 and outlined where the methodology presented within the SMR had been amended or advanced as a result of:

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

3.1.3 There were further updates to the scope and methodology which was used in the assessment presented in the AP1 ES, the SES and AP2 ES, the SES2 and AP3 ES. These updates focused on the following environmental topics in each of the subsequent SESs and AP ESs:

- AP1 ES: ecology, and landscape and visual assessment. These changes are outlined in Section 3.1 of the AP1 ES Volume 1 report;
- the SES and the AP2 ES: ecology, landscape and visual assessment, and air quality. The updates to the methodology to air quality were set out in a second SMR Addendum (CT-001-00/3 of the SES and AP2 ES). The changes in approach to these environmental topics are outlined in Section 4.3 of the SES and the AP2 ES Volume 1 report;
- the SES2 and the AP3 ES: ecology, traffic and transport, and air quality. The updates to the methodology for air quality and traffic and transport were set out in a third addendum to the SMR (Appendix CT-001-000/4 of the SES2 and the AP3 ES). This air quality section replaces the previous air quality sections included in the SMR and the previous addendums. The changes in approach to these environmental topics are outlined in Section 3.4 of the SES2 and the AP3 ES Volume 1 report; and
- the SES3 and the AP4 ES: ecology. This change is outlined in Section 3.2 of the SES3 and the AP4 ES Volume 1 report.

3.2 Scope and methodology for the SES₄ and the AP₅ ES

- 3.2.1 As with the approach taken for the previous ESs, prior to assessing the environmental effects of each SES₄ design change and AP₅ amendment, a scoping exercise was undertaken based on a precautionary approach.
- 3.2.2 The scoping exercise was used to determine whether the SES₄ design changes and AP₅ amendments had the potential to result in any new or different likely significant environmental effects.
- 3.2.3 Any SES₄ design changes and AP₅ amendments identified as having the potential to result in new or different likely significant environmental effects were then subject to further assessment work following the methodology outlined for each environmental topic in the SMR and the subsequent addendums and updates to methodology.
- 3.2.4 There are no additional updates or changes to the methodology applied in the SES₄ and the AP₅ ES.

General assumptions and limitations

- 3.2.5 During the preparation of an ES, there are sometimes circumstances in which the information available to inform the assessment process is limited. For example, there is inevitably some uncertainty in predicting future baseline conditions, impacts and effects, especially given that the scheme is not due to begin operating until 2026.
- 3.2.6 It is considered that the baseline is sufficiently robust to allow the assessment of the likely significant environmental effects of the scheme on the basis of a precautionary approach.
- 3.2.7 Where relevant, each environmental topic assessment explains the key assumptions made in undertaking the assessment, and their consequences on the completeness or potential accuracy of the conclusions have been identified. Section 8 in Volume 1 of the main ES provides a description of general assumptions and limitations for each environmental topic. Local assumptions and limitations are described within the SES₄ and the AP₅ ES Volume 2 CFA reports.
- 3.2.8 As with the previous SESs and AP ESs, the results of the climate change risk assessment reported in the main ES are still considered valid for the AP₅ revised scheme. Climate risks on the SES₄ scheme and AP₅ revised scheme will be addressed through future design, during construction (through implementation of the draft Code of Construction Practice (CoCP)), and in future operation and maintenance plans.

4 Approach to appendices in the SES₄ and the AP₅ ES

- 4.1.1 As with the main ES and the subsequent SESs and AP ESs, the SES₄ and AP₅ ES contain environmental appendix information to support the assessment of the design changes and amendments.
- 4.1.2 This information comprises updates to appendices within the main ES and should therefore be read in conjunction with them and, where relevant, the appendix updates in the subsequent SESs and AP ESs. For the majority of appendices, only minor updates are required as a result of new or different significant effects identified in the technical assessments of the SES₄ changes and AP₅ amendments, and therefore the SES₄ and the AP₅ ES appendix material is included within the relevant Volume 2 reports.
- 4.1.3 For the remaining appendices, a limited number of cultural heritage and sound, noise and vibration appendices required more substantial updates as a result of new or different significant effects identified in the technical assessments of the SES₄ changes and AP₅ amendments. These have been included as separate updated appendices in Volume 5 of the SES₄ and AP₅ ES. As with the approach taken in the previous ESs, the SES₄ and AP₅ ES appendices do not repeat information contained within the relevant main ES appendix or subsequent SES and AP ES appendices if that information does not require updating as a result of the changes within the SES₄ and the AP₅ ES (e.g. policy framework, information on methodologies etc.).
- 4.1.4 At a route-wide level the Summary of carbon calculation outputs appendix (CL-002-000) has been updated to provide a summary of the methodology and scoping outcomes as a result of the SES₄ design changes and AP₅ amendments.
- 4.1.5 The Planning data appendix (CT-004-000) has been updated to identify committed and proposed developments relevant to the SES₄ changes and AP₅ amendments, in addition to those identified in the main ES, the SES and AP₂ ES, the SES₂ and AP₃ ES or the SES₃ and AP₄ ES. Committed developments are defined as either approved consents or allocations in adopted local plans. Proposed developments are defined as either planning applications that have yet to be determined or development allocations included in local plans yet to be adopted.
- 4.1.6 During the scoping of SES₄ design changes and AP₅ amendments, it was determined that the electromagnetic interference appendix would not require updating as there would be no additional affected receptors identified from those previously assessed and reported within appendix EM-001-000, from the main ES, the AP₁ ES, the SES and AP₂ ES, the SES₂ and AP₃ ES and the SES₃ and AP₄ ES.
- 4.1.7 The Wider effects report in Volume 5 of the main ES (Appendix CT-005-000) assessed whether the power to deviate within statutory limits altered the significance of the effects as reported elsewhere in the main ES. The wider effects were also assessed for subsequent AP amendments, and reports were produced for the SES and AP₂ ES and the SES₃ and AP₄ ES. The mapping in the main ES shows the original scheme on the centre line for the permanent works. Limits of deviation shown on the Bill plans and

sections and described in the Bill enable the scheme to deviate slightly from the centre line of the works as may be required following detailed design.

- 4.1.8 The AP₅ amendments were reviewed qualitatively in order to identify whether a deviation within the statutory limits of deviation would introduce any new or different likely significant environmental effects to those previously reported. It was concluded that the changes are all relatively minor and do not affect the conclusions of previous ESs and therefore a Wider effects report for the SES₄ and AP₅ ES was not considered necessary.

5 Approach to mapping in the SES4 and the AP5 ES

- 5.1.1 Construction (CT-05) and operation (CT-06) mapping has been produced to indicate the SES4 design changes and the AP5 amendments. In each case, the relevant map from the main ES has been reproduced showing the original scheme and a second map showing the SES4 scheme and the AP5 revised scheme. On these maps a colour coded 'cloud' system is used, where:
- a grey 'cloud' indicates the location of AP1, AP2, AP3 and AP4 amendments, and SES, SES2 and SES3 design changes;
 - a blue 'cloud' indicates the location of SES4 design changes; and
 - a red 'cloud' indicates the location of AP5 amendments.
- 5.1.2 Other design changes which are within the existing powers of the Bill and do not result in new or different likely significant environmental effects are also shown on the maps, but are not indicated by a cloud. The CT-05 and CT-06 maps are included in the Volume 2 map book.
- 5.1.3 The relevant environmental maps in the volume 2 and 5 map books have been produced where any new or different likely significant environmental effects from those reported in the main ES, or where relevant, the subsequent SESs and AP ESs will occur. Maps have also been produced when features, resources, receptors, or viewpoints are added or removed from the main ES or subsequent SESs and AP ESs. On the maps, in general:
- red labels are used to show an increase in the magnitude of a likely significant environmental effect; and
 - green labels are used to show a reduction.
- 5.1.4 The descriptions on the labels indicate whether the change is from an SES4 design change or an AP5 amendment.
- 5.1.5 Maps have also been produced to highlight committed developments that have been identified since the submission of the main ES, or where relevant the subsequent SESs and AP ESs.

6 Approach to the construction programme and construction methods

- 6.1.1 Where there are changes to construction durations, these are described and assessed in the relevant Volume 2 CFA reports.
- 6.1.2 The assessment was based on the construction methodologies described in the main ES (e.g. approach to constructing stations, depots, cuttings, embankments, tunnels, viaducts and bridges) and updated in the AP1 ES. Further detail on construction methods can be found within Section 6 of Volume 1 of the main ES and Section 2 of Volume 1 of the AP1 ES.

7 Approach to mitigation associated with the SES₄ and the AP₅ ES

- 7.1.1 The measures that will be used to mitigate likely significant adverse environmental effects during construction and operation of the scheme are described in the main ES and the draft CoCP, which sets out measures to manage and control the effects of construction. These were provided to Parliament at the same time the Bill was deposited in November 2013. The same approach to mitigation measures described in the main ES still applies. Site-specific mitigation measures are described within volumes 2 and 3 of the SES₄ and the AP₅ ES, where required.

8 Consultation on the SES₄ and the AP₅ ES

- 8.1.1 A formal public consultation on both the SES₄ and the AP₅ ES is required by Parliamentary Standing Orders. Consultees will have 42 days to respond to the consultation following the deposit of the SES₄ and the AP₅ ES in Parliament and the first publication of the necessary newspaper notices that follow. Parliamentary officials have appointed an independent assessor who will summarise consultation responses and provide a report to Parliament before the Third Reading of the Bill.
- 8.1.2 There will also be a separate petitioning period. This petitioning period will provide an opportunity for individuals or organisations specially and directly affected by the changes in the SES₄ and amendments in the AP₅ ES to petition on the changes or amendments to the Bill.
- 8.1.3 More information on who may petition against the Bill, and how to do so, is available on Parliament's website (<http://www.parliament.uk>).

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Volume 2 | Community forum area reports

December 2015

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Structure of the HS₂ Supplementary Environmental Statement 4 and Additional Provision 5 Environmental Statement

The Supplementary Environmental Statement 4 (SES₄) and Additional Provision 5 Environmental Statement (AP₅ ES) comprises:

- Non-technical summary (NTS). This provides a summary in non-technical language of the SES₄ (Part 1) and AP₅ 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') as updated by subsequent SES and AP ES documents;
- Volume 1: introduction to the SES₄ and AP₅ ES. This introduces the design changes included within the SES₄, and the amendments, which have resulted in the need to amend the Bill, within the AP₅ ES. The report explains the scope, methodology, assumptions and limitations of the environmental assessment, and approach to consultation;
- Volume 2: community forum area (CFA) reports and map book. These describe the design changes included within the SES₄ (Part 1) and the amendments within the AP₅ ES (Part 2). Any new or different likely significant environmental effects arising from these changes and amendments in each CFA, compared to those reported in the main ES, as updated by the SES, SES₂ and SES₃ documents (and SES₄ for the AP₅ amendments) are reported. The AP₁, AP₂, AP₃ and AP₄ amendments are also taken into account where relevant;
- Volume 3: route-wide effects. This reports new or different likely significant route-wide effects arising from the design changes included within the SES₄ (Part 1) and the amendments within the AP₅ ES (Part 2) compared to those reported in the main ES as updated by SES, SES₂ and SES₃ (and SES₄ for the AP₅ amendments). The AP₁, AP₂, AP₃ and AP₄ amendments are also taken into account where relevant;
- Volume 5: appendices and map book. This contains environmental information and associated maps in support of the other volumes of the SES₄ and AP₅ ES; and
- glossary of terms and list of abbreviations. This contains any new or different terms and abbreviations used throughout the SES and AP ES reports,

additional to those included in the main ES.

There are no off-route design changes included within the SES₄ or amendments within the AP₅ ES, so no Volume 4 has been prepared.

For CFA22, the changes brought forward by AP₂ were substantial, and included changes to both the vertical and horizontal alignment of the HS2 route. The scale of the amendments was such that the Volume 2 report was rewritten in its entirety, effectively replacing the CFA22 Volume 2 document prepared for the main ES. There are no SES₄ changes in CFA22.

For CFA22 therefore, the AP₅ ES provides an assessment of any new or different likely significant environmental effects arising from the amendment compared to the AP₂ revised scheme, as updated by the SES₃ scheme, as it is assumed that the AP₅ amendment will only proceed in the event that the AP₂ amendments are enacted.

Structure of this report

This volume of the SES₄ and AP₅ ES is divided into the relevant CFA reports, which are in turn divided into two parts.

Part 1 provides supplementary environmental information relating to:

- changes to the design which do not require changes to the Bill; and
- a correction to the main ES.

Part 1 of each CFA report includes, where relevant:

- a description of the changes or updates within the CFA that have triggered the need for reassessment;
- an assessment of the environmental effects of the changes for relevant environmental topics considering the:
 - scope, assumptions and limitations of the SES₄ assessment;
 - changes of relevance to the assessment;
 - environmental baseline;
 - effects arising during construction;
 - effects arising from operation; and
 - mitigation and residual effects; and
- a summary of any new or different likely residual significant effects as a result of the changes.

Part 2 provides environmental assessment information relating to proposed amendments to the design, which have resulted in the need to alter the powers conferred by the Bill. The following is included where relevant:

- a summary of the proposed amendments within each CFA that have triggered the need for reassessment;
- a description of each amendment;
- an assessment of the environmental effects of each amendment for relevant environmental topics considering the:
 - scope, assumptions and limitations of the AP₅ ES assessment;
 - environmental baseline;
 - effects arising during construction;
 - effects arising from operation; and
 - mitigation and residual effects; and

- a summary of any new or different likely residual significant effects as a result of each proposed amendment.

1 Introduction

- 1.1.1 The Bill for high speed rail between London and the West Midlands was submitted to Parliament together with the main ES in November 2013. The AP1 ES, which was submitted in September 2014, contained generally minor amendments to the design of the original scheme (i.e. the scheme submitted in November 2013) in CFAs 7 – 26 (see Table 1 for further details). The SES and AP2 ES which was submitted in July 2015, updated the main ES and contained a number of further amendments to the design of the original scheme in CFAs 4 – 26. The SES2 and AP3 ES which was submitted in September 2015, contained further updates to the main ES and a number of further amendments to the design of the original scheme in CFAs 1 – 5. The SES3 and AP4 ES which was submitted in October 2015, contained further updates to the main ES and a number of further amendments to the design of the original scheme in CFAs 4 – 26.
- 1.1.2 Since the submission of the main ES and the subsequent SES and AP ES documents described above, changes to scheme design have occurred, which may lead to new or different significant effects. These effects, depending on the type of change, are reported in the SES4 (Part 1) or AP5 ES (Part 2) of this document.
- 1.1.3 The Bill and associated Additional Provisions (APs) to the Bill described above, if enacted by Parliament, will provide the powers to construct, operate and maintain Phase One of HS2.
- 1.1.4 In order to differentiate between the original scheme and the subsequent changes, the terms set out in Table 1 are used:

Table 1: Scheme definitions

Scheme name	Definition	Relevant CFAs
the original scheme	the Bill scheme submitted to Parliament in November 2013, which was assessed in the main ES	1–26
the AP1 revised scheme	the original scheme as amended by the AP submitted in September 2014	7–26 (excluding 8, 23 and 25)
the SES scheme	the original scheme with the design changes described in the SES submitted in July 2015	4–26
the AP2 revised scheme	the SES scheme as amended by the AP2 submitted in July 2015	4–26 (excluding 8)
the SES2 scheme	the original scheme as updated by the SES scheme, with the design changes described in the SES2 submitted in September 2015	1–5 (i.e. this applies in the London area only)
the AP3 revised scheme	the SES2 scheme as amended by the AP3 submitted in September 2015	1–3 (i.e. this applies in the London area only)

Scheme name	Definition	Relevant CFAs
the SES ₃ scheme	the SES ₂ scheme with the design changes described in the SES ₃ submitted in October 2015	4–26 (excluding 5 and 21)
the AP ₄ revised scheme	the SES ₃ scheme as amended by the AP ₄ submitted in October 2015	4–26 (excluding 14 and 21)
the SES ₄ scheme	the SES ₃ scheme with the design changes described in the SES ₄ submitted in December 2015	10, 13
the AP ₅ revised scheme	the SES ₄ scheme as amended by the AP ₅ submitted in December 2015	6, 7, 11, 12, 15, 20, 21, 22 and 24

- 1.1.5 SES₄ (Part 1 of each CFA report) describes changes to the scheme that have occurred within the current limits and powers of the Bill, and therefore do not require an AP to the Bill. This includes:
- changes to the design which do not require changes to the Bill; and
 - a correction to the main ES.
- 1.1.6 The changes are described in Part 1 of each CFA report under a series of sub-headings and assessed on a topic by topic basis using the same approach adopted in the main ES.
- 1.1.7 The purpose of SES₄ is to provide an assessment of any new or different likely significant environmental effects arising from the changes described.
- 1.1.8 The AP₅ ES (Part 2 of each CFA report) describes the likely significant effects of amendments to the design of the scheme, which require the use of land outside the original limits of the Bill, additional access rights, or other extensions to the powers conferred by the Bill, making it necessary to submit an AP to the Bill.
- 1.1.9 The AP₅ ES assesses each amendment separately for all relevant topics. The purpose of the AP₅ ES is to provide an assessment of any new or different likely significant environmental effects arising from the amendments compared to the SES₄ scheme, taking into account AP₁, AP₂, AP₃ and AP₄ amendments where relevant.
- 1.1.10 The standard measures that will be used to mitigate likely significant adverse environmental effects during construction and operation of the scheme are described in the main ES, 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 SES₄ and AP₅ ES.

CFA6 Part 1: Supplementary Environmental Statement 4

2 Summary of changes in CFA6

2.1 Changes to the design not requiring a change to the Bill

- 2.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA, which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES₃.

CFA6 Part 2: Additional Provision 5 Environmental Statement

3 Summary of amendments in CFA6

3.1.1 Table 2 provides a summary of the amendments in the South Ruislip to Ickenham area (CFA6), and Figure 1 shows the locations.

Table 2: Summary of amendments in CFA6

Name of amendment	Description of the SES4 scheme	Description of the AP5 revised scheme
Additional land required for the relocation of a car park and accommodation access changes for a pharmaceutical research facility near Ickenham (AP5-006-001)	The main ES described the Copthall retained structure, to be constructed on the north side of the HS2 route so the pharmaceutical research facility off Breakspear Road South could be retained. The main ES also identified the construction of a new access road into the pharmaceutical research facility and diversion of all associated utilities. The main ES reported that 12 buildings in the south of the pharmaceutical research facility were to be demolished and around 90 off-street parking spaces were to be permanently lost.	The amendment will provide a car park with a capacity of 50 parking spaces and a security gatehouse at the eastern end of the facility. A new 250m section of access road and diversion of all associated utilities will be provided. This will permanently require land outside the limits of the Bill. Separate from the amendment, the operators of the pharmaceutical research facility have indicated that a further 65 off-street parking spaces will be provided within two other car parking areas at the facility within land not required by the HS2 scheme. Therefore, together with the amendment, a total of 115 off-street car parking spaces will be provided.
Additional land required for utility works in the London Borough of Hillingdon (AP5-006-002)	The Bill provides for the reconductoring ¹ of an overhead power line along the boundary of CFA6 and CFA7 between Harvil Road and Breakspear Road North, in the London Borough of Hillingdon.	The temporary diversion of the fibre optic cable ² currently suspended between the pylons where reconductoring will be carried out. The cable will be laid in a shallow trench during the diversion. A corridor of land of up to 60m wide over an approximate 1km length will be temporarily required for access and working room. The land temporarily required is outside the limits of the Bill.
Additional land required for an overhead line diversion at Hillingdon Quarry (AP5-007-001)	The Bill provides for the permanent diversion of a 275kV overhead power line from the original alignment within CFA7 to a new alignment that crosses the HS2 route east of Harvil Road within CFA6. This would involve the removal and installation of a number of steel frame electricity pylons in CFA7 and two new pylons in CFA6.	The 275kV overhead power line will be diverted on a permanent new alignment that will cross the HS2 route approximately 500m west of Harvil Road within CFA7. This is described and assessed in the SES4 and AP5 ES, Volume 2, CFA7 report.

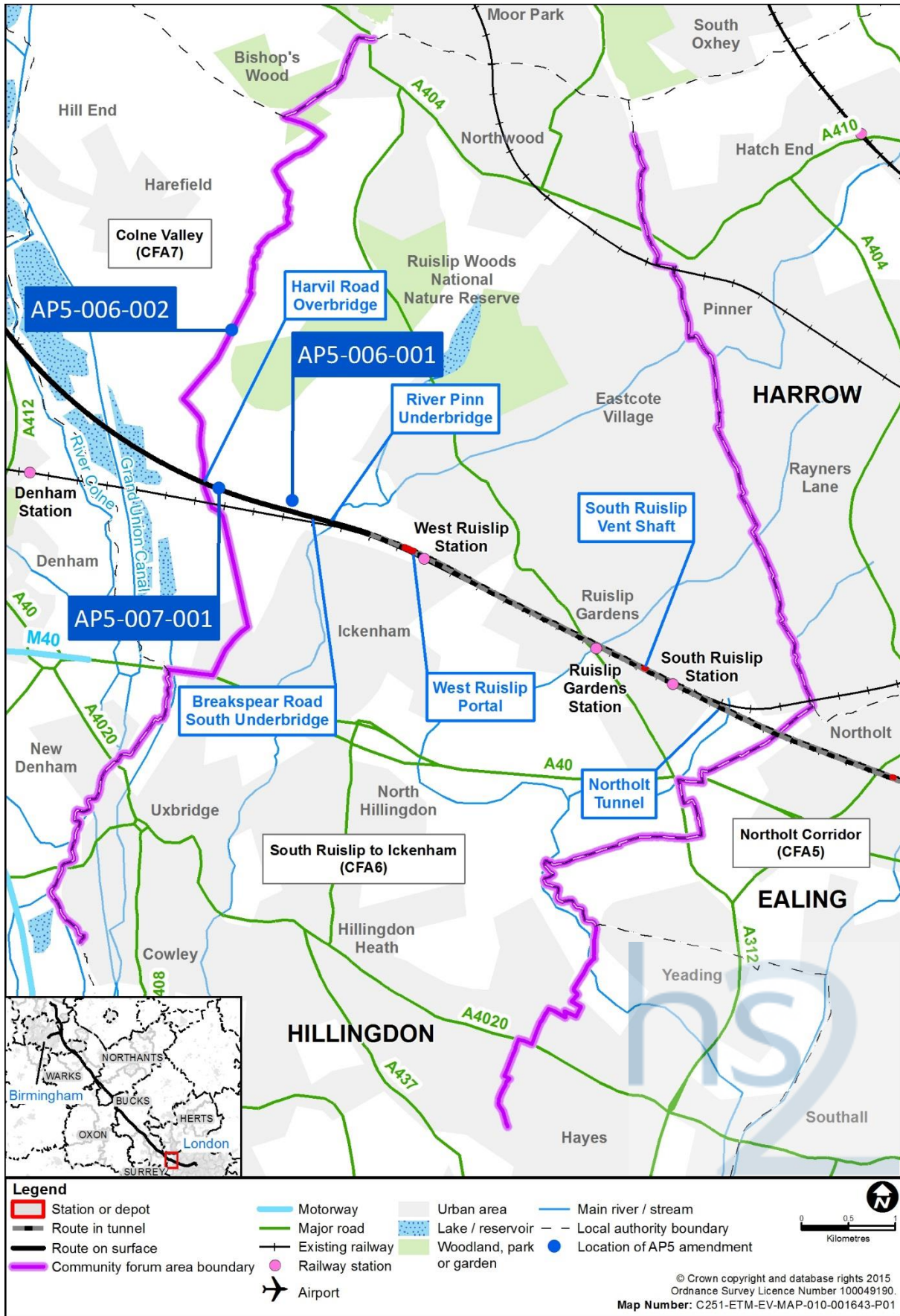
¹ Reconductoring is the process of installing or replacing conductors (or wires) on a section of overhead power line using winches.

² The fibre optic cable to be diverted is attached to the top of the pylons supporting the overhead power line.

SES₄ and AP₅ ES Volume 2

Name of amendment	Description of the SES ₄ scheme	Description of the AP ₅ revised scheme
		The two pylons in CFA6 will no longer be required. Therefore these will not be referred to further in this CFA report.

Figure 1: Locations of amendments in CFA6



4 Assessment of amendments in CFA6

4.1 Additional land required for the relocation of a car park and accommodation access changes for a pharmaceutical research facility near Ickenham (AP₅-006-001)

- 4.1.1 The Bill provides for the HS2 route north-west of Ickenham to be predominantly in cutting, known as the Brackenburg and Cophall cuttings, with a maximum depth of 20m below existing ground level. Key permanent features of this section include the Cophall retained structure south of the pharmaceutical research facility off Breakspear Road South, required in order to maintain existing operations at this site. The Bill includes the demolition of 12 buildings in the south of the pharmaceutical research facility and the loss of around 90 off-street parking spaces. The Bill also provides for the construction of a new access road into the pharmaceutical research facility off Breakspear Road and diversion of all associated utilities (refer to maps CT-05-019a and CT-06-019a in the main ES, Volume 2, CFA6 Map Book).
- 4.1.2 Part 2 of the SES₃ and AP₄ ES describes an amendment that removes the Cophall retained structure from the AP₄ revised scheme so that the cutting is continuous in this area. As a result, additional land will be required for earthworks as part of amendment AP₄-006-001. However, this does not change the significant effects identified in the main ES as a result of the loss of the parking spaces.
- 4.1.3 Since submission of the SES₃ and AP₄ ES, a car park with a capacity for approximately 50 spaces and a security gatehouse at the eastern end of the pharmaceutical research facility is proposed, to allow for operation of the remainder of the facility. A new 250m section of access road and diversion of the associated utilities will also be provided. The area of land required for construction of the car park and part of the access road is within a grassed area located east of the existing car park and west of Newyears Green Lane, south-west of Bridleway U42. The trees along the eastern edge of the proposed car park on the land to be acquired will be retained. The remaining area of land is hardstanding (refer to maps CT-05-019a and CT-06-019a in the SES₄ and AP₅ ES, Volume 2 Map Book).
- 4.1.4 Separate from the amendment, the operators of the pharmaceutical research facility have indicated that a further 65 parking spaces will be provided within two other car parking areas at the facility within land not required by the HS2 scheme. Therefore, together with the amendment, a total of 115 off-street car parking spaces will be provided.
- 4.1.5 Approximately 0.65ha of additional land will be permanently required. The additional land needed is not included in the Bill, hence the need for this amendment.
- 4.1.6 The provision of a new car park and accommodation access, and reconnection of utilities is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to: agriculture, forestry and soils; air quality; community; cultural heritage; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration; and water resources and flood risk assessment. However, there were

changes where reassessment was considered to be required in respect of ecology and traffic and transport.

Ecology

Introduction

- 4.1.7 This section of the report describes the environmental baseline in relation to ecology that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme.

Scope, assumptions and limitations

- 4.1.8 The key assumptions and limitations, and the methodology for determining significance of effects for ecology are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/01), the SMR Addendum (Volume 5: Appendix CT-001-000/02) of the main ES and Addendum 4 to the SMR (SES₃ and AP₄ ES, Volume 5: CT-001-000/5).
- 4.1.9 To address any limitations in data, a precautionary baseline has been considered according to the guidance reported in the main ES, Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment. The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the AP₅ revised scheme.

Existing baseline

- 4.1.10 The ecological baseline of the land required for the amendment has been based on field data collated for the main ES, additional survey work for bats undertaken between June and August 2014, reported in the SES and AP₂ ES, and aerial photography.
- 4.1.11 A summary of the baseline information relevant to the assessment of the amendment is provided below. This takes account of any relevant 2014 and 2015 survey information provided in SES₃ and AP₄ ES Volume 5: Appendix EC-001-001, and SES and AP₂ ES, Volume 5: Appendix EC-001-001 and EC-002-001 (and map series EC-04 to EC-06 and EC-12). For those receptors described in the main ES, further details are provided in Volume 2, CFA6 Report, Section 7 of the main ES and in Volume 5, including maps EC-01 to EC-12 of the main ES.

Designated sites

- 4.1.12 There are no statutory or non-statutory designated nature conservation sites or ancient woodland relevant to the assessment.

Habitats

- 4.1.13 The land required for the amendment is 0.65ha, of which 0.3ha is amenity grassland required for the construction of the car park and part of the access road. The amenity grassland is of negligible ecological value. The remaining area of land is hardstanding.

Protected and/or notable species

- 4.1.14 The Gatemead bridleway and land adjacent to the amendment is used by bats from bat assemblages associated with the Brackenbury Farm and Gatemead Farm area reported in the main ES (assumed to support maternity roosts of common pipistrelles and non-maternity roosts of rarer bat species), which are both of up to county/metropolitan value.

Future baseline

Construction (2017)

- 4.1.15 The future baseline for construction in 2017 remains unchanged from that reported in the main ES; the SES and AP2 ES; and the SES3 and AP4 ES.

Operation (2026)

- 4.1.16 The future baseline for operation in 2026 remains unchanged from that reported in the main ES; the SES and AP2 ES; and the SES3 and AP4 ES.

Effects arising during construction

Avoidance and mitigation measures

- 4.1.17 The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES), which includes translocation of protected species where appropriate.

Designated sites

- 4.1.18 The amendment will not generate any new or different significant effects on designated sites, or change the level of significance of the effects reported in the main ES.

Habitats

- 4.1.19 The additional area of 0.3ha of amenity grassland has little ecological value, and hence the effect of relocation of the car park and inclusion of a new section of access road with associated utilities diversions will not be significant, and will not change the level of significance of the effects reported in the main ES.

Protected and/or notable species

- 4.1.20 The main ES reported that the loss of roost sites, including potential pipistrelle maternity roosts at the pharmaceutical research facility would result in significant effects at up to the county/metropolitan level on the bat populations associated with the Brackenbury Farm and Gatemead Farm area. The amendment will not generate any new or different significant effects on protected and/or notable species, or change the level of significance of the effects reported in the main ES.

Cumulative effects

- 4.1.21 There are no new or different likely significant cumulative effects for ecology as a result of the amendment acting in combination with another amendment in AP5, or in AP2, or AP4, or as a result of any relevant committed development interacting with the AP5 revised scheme.

Mitigation and residual effects

Other mitigation measures

- 4.1.22 No additional mitigation measures (i.e. in addition to those identified in the main ES, the SES and AP₂ ES, and the SES₃ and AP₄ ES) are required.

Summary of likely residual effects

- 4.1.23 No new or different residual effects on ecological receptors occur as a consequence of the amendment. The significant residual effects of the AP₅ revised scheme in this area are therefore unchanged from those reported in the main ES, the SES and AP₂ ES, and the SES₃ and AP₄ ES.

Effects arising from operation

Avoidance and mitigation measures

- 4.1.24 The lighting design in the new car park areas will incorporate measures to minimise light spill onto the adjacent Bridleway U₄₂ and Brackenbury cutting, in order to avoid operational impacts on bats. This will include use of appropriate best practice measures, for example shrouding and/or directional lighting.

Designated sites

- 4.1.25 The AP₅ amendment will not give rise to new or different significant effects on designated sites during operation and will not change the level of significance of the effects reported in the main ES.

Habitats

- 4.1.26 The amendment will not give rise to new or different significant effects on habitats during operation and will not change the level of significance of the effects reported in the main ES.

Protected and/or notable species

- 4.1.27 The main ES reports operational disturbance to commuting and foraging bats arising from noise, vibration and light associated with passing trains. Such effects were acknowledged as affecting only a small proportion of the available habitat that bats were likely to utilise in the local area. However, prior to mitigation the main ES reported a precautionary adverse effect significant at the county/metropolitan level on the favourable conservation status of the bat assemblage in the Brackenbury Farm and Gatemead Farm area, due to the potential for collisions with passing trains.
- 4.1.28 The main ES identified the area south-west of Gatemead Farm, including Bridleway U₄₂ and Brackenbury cutting, used by high numbers of foraging common and soprano pipistrelles, with rarer bats such as noctule, Leisler's bat, serotine and *Myotis* species recorded in lower numbers. These foraging bats are likely to be associated with potential roosts in trees along the U₄₂ Bridleway, farm buildings at Gatemead Farm and Brackenbury Farm, and the pharmaceutical research facility.
- 4.1.29 The operational lighting design of the car park will incorporate measures to minimise light spillage as provided for in the CoCP. Therefore, the amendment is not expected to result in any new or different adverse significant effect on the bat assemblage at

Brackenbury Farm and Gatemead Farm, or change the level of significance reported in the main ES.

Cumulative effects

- 4.1.30 There are no new or different likely significant cumulative effects for ecology as a result of the amendment acting in combination with another amendment in AP₅, or in AP₂, or AP₄, or as a result of any relevant committed development interacting with the AP₅ revised scheme.

Mitigation and residual effects

Other mitigation measures

- 4.1.31 The Bill provides for the creation of woodland at the top of the Copthall Cutting and adjacent to the new railway to encourage bats to fly at a safe height over the original scheme between Newyears Green Covert to the north and Copthall Covert to the south. It is expected that this measure will reduce the precautionary county/metropolitan level operational effect on the bat assemblage in the Brackenbury Farm and Gatemead Farm area to a level that is not significant.
- 4.1.32 Sensitive lighting design has been assumed, and therefore no additional mitigation measures (i.e. in addition to those identified in the main ES, the SES and AP₂ ES, and the SES₃ and AP₄ ES) are required.

Summary of likely residual effects

- 4.1.33 The amendment will not give rise to any new or different significant operational effects and will not change the level of significance of the effects reported in the main ES.

Traffic and transport

Introduction

- 4.1.34 This section of the report describes the environmental baseline in relation to traffic and transport that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the AP₅ amendment, compared to those of the SES₄ scheme.

Scope, assumptions and limitations

- 4.1.35 The assessment scope, key assumptions and limitations for the traffic and transport assessment are as set out Volume 1, the SMR (Appendix CT-001-000/1) and the SMR Addendum (Appendix CT-001-000/2) of the main ES.

Existing baseline

- 4.1.36 The baseline traffic and transport information for CFA6, South Ruislip to Ickenham is as described in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.

Future baseline

Construction

- 4.1.37 The future baseline for construction remains unchanged from that reported in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.

Operation (2026 and 2041)

- 4.1.38 The future baselines for operation in 2026 and 2041 remain unchanged from those reported in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.

Effects arising during construction

- 4.1.39 The amendment will not give rise to a new or different significant traffic and transport effect on the car park during construction and will not change the level of significance of the effects reported in the main ES.

Effects arising during operation

- 4.1.40 The main ES (Volume 2, CFA6, Section 12) reported a moderate adverse effect from the permanent loss of a car park with a capacity for 90 parking spaces at the pharmaceutical research facility.
- 4.1.41 The amendment will provide a car park with a capacity for 50 off-street parking spaces. Separate from the amendment, the operators of the pharmaceutical research facility have indicated that a further 65 off-street parking spaces will be provided within two other car parking areas at the facility within land not required by the HS₂ scheme. Therefore, together with the amendment, a total of 115 off-street car parking spaces will be provided, which is greater than the 90 off-street parking spaces that would have been lost under the original scheme. This will remove the significant moderate adverse effect on parking reported in the main ES.
- 4.1.42 The changes to significant operational effects of the AP₅ revised scheme are shown on map TR-04-009 in the SES₄ and AP₅ ES, Volume 5 Map Book.

Mitigation and residual effects

- 4.1.43 No further mitigation measures are required.
- 4.1.44 The AP₅ amendment, in combination with the provision of an additional 65 off-street parking spaces will remove the moderate adverse significant residual effect on parking reported in the main ES.

Cumulative effects

- 4.1.45 The assessment has taken into account cumulative effects, including planned developments, by taking account of background traffic growth, as well as traffic and transport impacts of works being undertaken in other areas.
- 4.1.46 There are no new or different likely significant cumulative effects for traffic and transport as a result of AP₅ amendments interacting with one another or any relevant AP₂ or AP₄ amendments.

Summary of new or different likely residual significant effects as a result of the amendment

- 4.1.47 The provision of 50 car parking spaces as a result of the amendment, in combination with the provision of an additional 65 off-street parking spaces within two other car parks within the facility in land not required by the HS2 scheme, will reinstate all 90 of the off-street parking spaces that were reported as being lost in the original scheme and provide a total of 115 off street car parking spaces. This will remove the moderate adverse significant residual traffic and transport effect on parking reported in the main ES.

4.2 Additional land required for utility works in the London Borough of Hillingdon (AP5-006-002)

- 4.2.1 The Bill provides for land for reconductoring of an overhead power line along the boundary of the South Ruislip to Ickenham area (CFA6) and the Colne Valley area (CFA7) between Harvil Road and Breakspear Road North, in the London Borough of Hillingdon (refer to maps CT-05-019b-R1 and CT-05-019b-R2 of the main ES, Volume 2, CFA7 Map Book).
- 4.2.2 Since submission of the Bill, it has been identified that additional land is required for the temporary diversion of the fibre optic cable suspended between the pylons, which is necessary for reconductoring. This will be carried out at ground level. The fibre optic cable is approximately 10mm in diameter and will be laid in a trench up to 30cm wide by 40cm deep with a working area of up to 10m wide along the cable run. The cable will, as required, be protected by a flexible duct. At this stage the exact route for the fibre optic cable diversion cannot be finalised. Therefore, a corridor of up to 60m wide is identified along the length of the overhead power lines, to enable the diversion works to avoid sensitive receptors during detailed design (refer to maps CT-05-019b-R1 and CT-05-019b-R2 of the SES4 and AP5 ES, Volume 2 Map Book).
- 4.2.3 The diversion will begin at the pylon at grid reference E4 in map CT-05 019b-R1 of the SES4 and AP5 ES, Volume 2 Map Book. This is approximately 500m north of Harvil Road and Lower Lodge. The diversion will extend 1km north, ending at the pylon at grid reference E2 in map CT-05 019b-R2 of the SES4 and AP5 ES, Volume 2 Map Book. This is approximately 250m north of Breakspear Road North, near Bourne Farm.
- 4.2.4 Where the cable crosses Breakspear Road North, it will be passed through any suitable existing duct or culvert that is present within the 60m corridor. If no such opportunity exists, Breakspear Road North will be restricted for up to two hours while the cable is laid across the surface of the road and fixed into position. Suitable traffic management arrangements will be put in place. The diversion will cross the Newyears Green Bourne three times, where the cable will be laid over the top without affecting flow levels in this watercourse. Where the cable is laid through or along a hedge, it will be fed through the hedge or laid along it at the surface to avoid damage to the hedge.
- 4.2.5 The estimated duration of the works in this area, including diversion of the fibre optic cable, is anticipated to be approximately five months. Approximately 4.14ha of additional land is required temporarily for this amendment. The additional land is not included within the limits of the Bill, hence the need for this amendment.

- 4.2.6 Land is required temporarily for construction only. The land affected by the amendment is predominantly arable land. Once the work is complete the land will be returned to its former use. The diversion will not change construction traffic flows as set out in the main ES or alter construction assumptions for the work at the pylons.
- 4.2.7 The temporary diversion of the fibre optic cable is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to any environmental topic.

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5 Summary of changes in CFA7

5.1 Changes to the design not requiring a change to the Bill

- 5.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA, which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES₃.

CFA7 Part 2: Additional Provision 5 Environmental Statement

6 Summary of amendments in CFA7

6.1.1 Table 3 provides a summary of the amendments in the Colne Valley area (CFA7), and Figure 2 shows the locations.

Table 3: Summary of amendments in CFA7

Name of amendment	Description of the SES4 scheme	Description of the AP5 revised scheme
<p>Additional land required for utility works in the London Borough of Hillingdon (AP5-006-002)</p> <p>This amendment is described in the SES4 and AP5 ES, Volume 2, CFA6 report.</p>	<p>The Bill provides for the reconductoring³ of an overhead power line along the boundary of CFA6 and CFA7 between Harvil Road and Breakspear Road North, in the London Borough of Hillingdon.</p>	<p>The temporary diversion of the fibre optic cable⁴ suspended between the pylons where reconductoring will be carried out. The cable will be laid in a shallow trench. A corridor of land of up to 60m wide over a length of approximately 1km will be temporarily required for access and working room.</p> <p>The land temporarily required is outside Bill limits.</p>
<p>Additional land required for an overhead line diversion at Hillingdon Quarry (AP5-007-001)</p>	<p>The Bill provides for the permanent diversion of a 275kV overhead power line from the original alignment (50m north of the Hillingdon Outdoor Activity Centre (HOAC) within CFA7) to a new alignment that crosses the HS2 route east of Harvil Road (within CFA6). This would involve the removal of four existing pylons and the replacement of one existing pylon in CFA7. The diversion would consist of seven new pylons, five of which would be in CFA7 and two in CFA6.</p> <p>The AP2 revised scheme (AP2-007-002) provides for realignment of the permanent diversion and an additional pylon.</p>	<p>The 275kV overhead power line will be diverted on a permanent new alignment that will cross the HS2 route approximately 500m west of Harvil Road within CFA7.</p> <p>This amendment is partly dependent on and partly revises amendment AP2-007-002 and will only be implemented if amendment AP2-007-002 is enacted.</p>
<p>Revised permanent diversion of Bridleway DEN/3 Ricks 002 near Denham (AP5-007-002)</p>	<p>The Bill provides for the permanent diversion of Bridleway DEN/3 Ricks 002 approximately 150m to the south of the existing alignment in order to pass under the HS2 route at the Colne Valley viaduct, adding 270m to the existing bridleway.</p>	<p>Bridleway DEN/3 Ricks 002 will be permanently diverted on the east side of the HS2 route around the east side of a block of landscape mitigation planting. The permanent diversion will add approximately 200m to the current alignment of the bridleway, which is 70m shorter than the diversion proposed in the original scheme.</p>

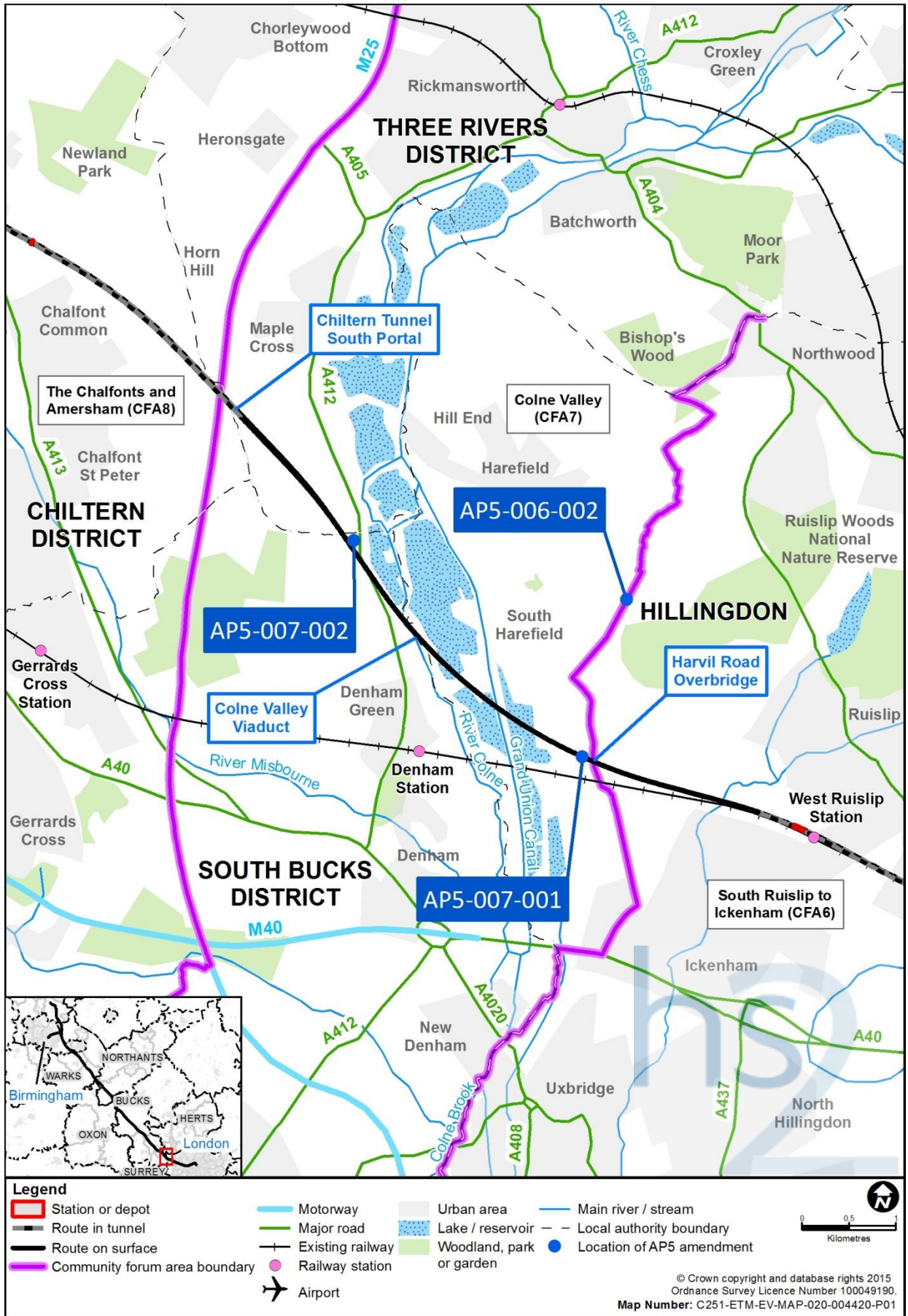
³ Reconductoring is the process of installing or replacing conductors (or wires) on a section of overhead power line using winches.

⁴ The fibre optic cable to be diverted is attached to the top of the pylons supporting the overhead power line.

SES₄ and AP₅ ES Volume 2

Name of amendment	Description of the SES ₄ scheme	Description of the AP ₅ revised scheme
		No additional land is required for this amendment.

Figure 2: Locations of amendments in CFA7



7 Assessment of amendments in CFA7

7.1 Additional land required for an overhead line diversion at Hillingdon Quarry (AP5-007-001)

- 7.1.1 The Bill provides for the permanent diversion of 275kV overhead power lines from their original alignment (50m north of the HOAC) to a new alignment that crosses the HS2 route east of Harvil Road. The alignment passes through Uxbridge Golf Club, over Harvil Road, northwards over the HS2 route and then back in a north-westerly direction to the National Grid feeder station north-east of HOAC (refer to maps CT-05-019b, CT-06-019b, CT-05-019b-L1 and CT-06-019b-L1 of the main ES, Volume 2, CFA7 Map Book).
- 7.1.2 This would involve the removal of four existing steel frame electricity pylons and the replacement of one existing steel frame electricity pylon. All the pylons are in the Colne Valley area (CFA7). The diversion would consist of seven new pylons, five of which would be in CFA7 and two in CFA6.
- 7.1.3 The four pylons to be removed are approximately 63m high and located at approximately:
- 200m north-west of Dews Farm (grid reference C6 in map CT-05-019b of the main ES, Volume 2, CFA7 Map Book);
 - 30m east of the Grand Union Canal, on the bank of Harefield No 2 Lake (grid reference C8 in map CT-05-019b and grid reference C2 in map CT-05-019b-L1 of the main ES, Volume 2, CFA7 Map Book);
 - 30m west of the Grand Union Canal, to the west of the Chiltern Mail Line (grid reference C10 in map CT-05-019b and grid reference C3 in map CT-05-019b-L1 of the main ES, Volume 2, CFA7 Map Book); and
 - 30m west of the Grand Union Canal, to the west of the Chiltern Mail Line (grid reference D6 in map CT-05-019b-L1 of the main ES, Volume 2, CFA7 Map Book).
- 7.1.4 The one pylon to be replaced is adjacent to the proposed National Grid feeder station (grid reference D2 in map CT-05-19b of the main ES, Volume 2, CFA7 Map Book).
- 7.1.5 The Bill also provides for a National Grid feeder station, approximately 300m north of Dews Lane.
- 7.1.6 The AP2 revised scheme includes the revised alignment of the diverted 275kV overhead power lines as part of AP2-007-002 (SES and AP2 ES, Volume 2, CFA7 Section 5.2). The amendment does not alter the number of pylons that will be removed or replaced in the original scheme, however it provides for one new permanent pylon and amends the location of six of the seven pylons that were provided as part of the original scheme, four of which would be in the Colne Valley area (CFA7) and two in the South Ruislip to Ickenham area (CFA6).
- 7.1.7 AP2-007-002 also provides for an additional area of approximately 0.5ha of land, required temporarily to provide a working area for reconductoring that lies south of

the Chiltern Main Line and west of the existing alignment of Harvil Road (refer to grid references F₃, G₃ and F₄, map CT-05-019b-L1 in the SES and AP₂ ES, Volume 2, CFA₇ Map Book).

- 7.1.8 Since submission of the SES and AP₂ ES, further consideration has been given to the diversion route, including with respect to programme and construction issues with the building of bridges at Harvil Road, and the requirement to enter Uxbridge Golf Club. The AP₅ amendment therefore places the 275kV overhead power lines on a permanent new alignment that will cross the HS₂ route approximately 500m west of Harvil Road. It will involve the removal of the same four electricity pylons from the existing alignment and one replacement pylon, but only three of the proposed new pylons in the CFA₇ area (one from the original scheme and two from the AP₂ revised scheme) are required. These are located as follows:
- adjacent to the proposed National Grid feeder station (refer to grid reference D₃, maps CT-05-019b and CT-06-019b in the SES₄ and AP₅ ES, Volume 2 Map Book);
 - approximately 100m west of Dew's Farm Cottages (refer to grid reference E₅, maps CT-05-019b and CT-06-019b in the SES₄ and AP₅ ES, Volume 2 Map Book); and
 - on the west bank of the Grand Union Canal (refer to grid reference D₆, maps CT-05-019b-L1 and CT-06-019b-L1 in the SES₄ and AP₅ ES, Volume 2 Map Book).
- 7.1.9 The AP₅ revised scheme includes two new pylons, not proposed in the original scheme or the AP₂ revised scheme, located as follows:
- on the north side of the Chiltern Main Line (refer to grid reference F₈, maps CT-05-019b and CT-06-019b, and to grid reference F₁, maps CT-05-019b-L1 and CT-06-019b-L1 in the SES₄ and AP₅ ES, Volume 2 Map Book); and
 - on the east bank of Denham Quarry Lake B (refer to grid reference E₄, maps CT-05-019b-L1 and CT-06-019b-L1 in the SES₄ and AP₅ ES, Volume 2 Map Book).
- 7.1.10 All the new pylons will be approximately 63m high. South of the Chiltern Main Line, the diverted cables will oversail Hillingdon quarry. The 2.4ha of additional land within Hillingdon quarry needed for AP₅-007-001 is not included within the Bill or the AP₂ revised scheme, hence the need for this amendment. The diversion works within the quarry will be limited to unwinding a pilot cable and the erection of scaffolding; no excavation will be undertaken. The overall works for the whole diversion are expected to take approximately one year to complete.
- 7.1.11 This amendment will only be implemented if the amendment AP₂-007-002 is enacted.
- 7.1.12 Realignment of the diversion of overhead power lines is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to: agriculture, forestry and soils; air quality; community; cultural heritage; ecology; land quality; socio-economics; sound, noise and vibration; and traffic and transport. However, reassessment was considered

to be required in respect of: landscape and visual assessment; and water resources and flood risk assessment.

Landscape and visual assessment

Introduction

- 7.1.13 This section of the report describes the environmental baseline in relation to landscape and visual that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the AP₂ amendment (AP₂-007-002) as revised by the AP₅ amendment, compared to those of the SES₄ scheme.

Scope, assumptions and limitations

- 7.1.14 The assessment scope, key assumptions and limitations for landscape and visual assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES. Updates to the methodology for the landscape and visual assessment are also described in Volume 1 of the AP₁ ES and Volume 1 of the SES and AP₂ ES.

Existing baseline

- 7.1.15 The amendment is located within the Harefield Farmland Valley Slopes Landscape Character Area (LCA) and the Colne River Valley LCA as described in the main ES (Volume 2, CFA6, Section 9 and Volume 2, CFA7, Section 9).
- 7.1.16 The following viewpoints are located in close proximity to the amendment and are described in the main ES (Volume 2, CFA6, Section 9 and Volume 2, CFA7, Section 9):
- Viewpoint 049.3.005: view west from Public Right of Way (PRoW) (Footpath U50);
 - Viewpoint 049.2.007: view north and east from dwelling on Harvil Road and from Harvil Road;
 - Viewpoint 051.3.002: view north along the Grand Union Canal PRoW (Footpath U72) and the Colne Valley Trail PRoW (Footpath U75);
 - Viewpoint 051.4.003: view north from Chiltern Main Line;
 - Viewpoint 052.4.001: view south from Harvil Road;
 - Viewpoint 052.3.002 view south from the northern edge of Harefield No.2 Lake from PRoW (Footpath U34); and
 - Viewpoint 052.6.003: view south from Dogs Trust Harefield including Highway Farmhouse, grade II listed (in CFA6).

Future baseline

Construction (2017)

- 7.1.17 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA6, Section 9.3 and Volume 2, CFA7, Section 9.3), the SES

and AP2 ES (Volume 5: Appendix CT-004-000), and the SES3 and AP4 ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 7.1.18 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA6, Section 9.3 and Volume 2, CFA7, Section 9.3), the SES and AP2 ES (Volume 5: Appendix CT-004-000), and the SES3 and AP4 ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

Landscape assessment

- 7.1.19 The main ES reported major adverse significant effects on the Harefield Farmland Valley Slopes LCA and the Colne River Valley LCA due to the construction of the Colne Valley viaduct, the diversion of the overhead power line, the prominence of cranes and construction plant and the presence of satellite compounds, hoardings and haul roads in the landscape. The amendment will realign the power lines to a route closer to the existing power lines than would have been the case in the original scheme. The diversion of the overhead power lines will affect a smaller area than the power line diversion of the original scheme, but this will be a relatively small change in the context of the large-scale construction works already taking place. Consequently, it will not give rise to a new or different significant effect and will not change the level of significance of the effects on the Harefield Farmland Valley Slopes LCA and the Colne River Valley LCA reported in the main ES.

Visual assessment

- 7.1.20 The main ES reported significant adverse effects on the following viewpoints (with the effects reported in the main ES listed in brackets):
- Viewpoint 049.3.005: view west from PRoW (Footpath U50) (major adverse);
 - Viewpoint 049.2.007: view north and east from dwelling on Harvil Road and from Harvil Road (major adverse);
 - Viewpoint 051.3.002: view north along the Grand Union Canal PRoW (Footpath U72) and the Colne Valley Trail PRoW (Footpath U75) (major adverse);
 - Viewpoint 051.4.003: view north from Chiltern Main Line (moderate adverse);
 - Viewpoint 052.4.001: view south from Harvil Road (moderate adverse);
 - Viewpoint 052.3.002: view south from the northern edge of Harefield No.2 Lake from PRoW (Footpath U34) (major adverse); and
 - Viewpoint 052.6.003: View south from Dogs Trust Harefield including Highway Farmhouse grade II listed (moderate adverse).
- 7.1.21 The amendment will realign the overhead power lines to a route closer to the existing power lines than would have been the case in the original scheme. The diversion of the overhead power lines will affect a smaller area than the power line diversion of the original scheme, but this will be a relatively small change in the context of the large-scale construction works already taking place. Consequently, the amendment will not

give rise to new or different significant effects on visual receptors and will not change the level of significance of the effects reported in the main ES.

Effects arising from operation

Landscape assessment

- 7.1.22 The Harefield Farmland Valley Slopes LCA was assessed as being affected by the original scheme, and will also be affected by this amendment. The LCA is located in green belt and is of regional value, therefore it has a high sensitivity to change. The main ES reported a major adverse significant effect in year 1 of operation, reducing to moderate adverse significant effect by year 15 and minor adverse non-significant by year 60, when mitigation planting will have fully established. These effects are due to the presence of the Colne Valley viaduct, overhead line equipment, trains, the Ickenham auto-transformer feeder station and the realignment of Harvil Road.
- 7.1.23 The Colne River Valley LCA was assessed as being affected by the original scheme, and will also be affected by this amendment. The LCA is located in green belt, contains two conservation areas, and the Denham Country Park Local Nature Reserve and is of regional value. It therefore has a high sensitivity to change. The main ES reported a major adverse significant effect in year 1 of operation, reducing to a moderate adverse significant effect by year 15 and on to year 60, when mitigation planting will have fully established but the viaduct will still be prominent in the LCA. These effects are due to the presence of the viaduct and the trains and the loss of tranquillity.
- 7.1.24 The amendment will realign the power lines closer to the route of the existing power lines than would have been the case in the original scheme. The pylons and overhead power lines will form additional features that will be largely inconspicuous in their setting, due to the presence of the existing power infrastructure in the landscape. This will not give rise to a new or different significant effect and will not change the level of significance of the effects on the LCAs reported in the main ES.

Visual assessment

- 7.1.25 The amendment will result in the relocation of the power lines closer to the route of the existing power lines than would have been the case in the original scheme. The following viewpoints were assessed as being affected by the original scheme and will be affected by this amendment (with the effects reported in the main ES listed in brackets):
- Viewpoint 049.3.005: view west from PRoW (Footpath U50) (moderate adverse in year 1, non-significant by years 15 and 60);
 - Viewpoint 049.2.007: view north and east from dwelling on Harvil Road and from Harvil Road (major adverse in year 1, non-significant by years 15 and 60);
 - Viewpoint 051.3.002: view north along the Grand Union Canal PRoW (Footpath U72) and the Colne Valley Trail PRoW (Footpath U75) (moderate adverse in years one, 15 and 60);
 - Viewpoint 051.4.003: view north from Chiltern Main Line (moderate adverse in years one, 15 and 60);

- Viewpoint 052.4.001: view south from Harvil Road (moderate adverse in year 1, non-significant by years 15 and 60);
- Viewpoint 052.3.002: view south from the northern edge of Harefield No.2 Lake from P_{RoW} (Footpath U₃₄) (major adverse in years 1, 15 and 60); and
- Viewpoint 052.6.003: view south from Dogs Trust Harefield including Highway Farmhouse grade II listed (moderate adverse in year 1, non-significant by years 15 and 60).

7.1.26 The effects reported in the main ES were due to the presence in the view of the Colne Valley viaduct, the diverted overhead power lines, trains, overhead line equipment, noise fence barriers and the Ickenham auto-transformer feeder station. The amendment affects just one of these elements and therefore the change in the view will be minimal or inconspicuous in the context of the other substantial changes.

7.1.27 The amendment to realign the diversion of overhead power lines will not give rise to new or different significant effects and will not change the level of significance of the effects reported in the main ES.

Mitigation and residual effects

7.1.28 No additional mitigation measures (i.e. in addition to those identified in the main ES) are required.

7.1.29 The amendment to realign the diversion of overhead power lines will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES.

Cumulative effects

7.1.30 There are no new or different likely significant cumulative temporary effects for landscape and visual assessment as a result of the AP₂ amendment (AP₂-007-002) as revised by the AP₅ amendment interacting with another AP₅ amendment or the AP₁, other AP₂ or AP₄ amendments or any relevant committed developments.

Water resources and flood risk assessment

Introduction

7.1.31 This section of the report describes the environmental baseline in relation to water resources and flood risk assessment that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the AP₂ amendment (AP₂-007-002) as revised by the AP₅ amendment, compared to those of the SES₄ scheme.

7.1.32 This section also takes into account the AP₄ amendment (AP₄-007-003) for the temporary provision of turbidity treatment equipment to mitigate potential impacts arising from construction of the pylons.

Scope, assumptions and limitations

7.1.33 The assessment scope, key assumptions and limitations for the water resources and flood risk assessment are as set out Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

- 7.1.34 It is assumed that the permanent pylons in the AP₅ revised scheme will require piled foundations up to 30m depth, which will penetrate the Chalk aquifer.
- 7.1.35 The pylons are not located within an area at risk of flooding from rivers, surface water, groundwater, sewers or artificial waterbodies. The effect on the risk of flooding is therefore not considered further in the assessment of this amendment.
- 7.1.36 The assessment assumes the implementation of the mitigation measures set out in the main ES (Volume 2, CFA7, Section 13.4) and in the draft CoCP (main ES, Volume 5: Appendix CT-003-000) including measures to control sediment mobilisation and the risk of spills.

Existing baseline

- 7.1.37 A summary of the baseline information relevant to the assessment of the amendment is provided below. For those receptors described in the main ES, further details are provided in the main ES, Volume 2, CFA7, Section 13.3 and in Volume 5 of the main ES.
- 7.1.38 The principal geology underlying the site, as mapped by the British Geological Survey (BGS), comprises the Cretaceous Chalk of the Seaford Chalk Formation and the Newhaven Chalk Formation (undifferentiated), which is overlain in some areas by the Lambeth Group (Woolwich and Reading beds).
- 7.1.39 The Seaford Chalk Formation and the Newhaven Chalk Formation (undifferentiated) are classified as a Principal Aquifer, and the Lambeth Group as a Secondary A Aquifer. Where the Chalk outcrops it is largely overlain by superficial deposits comprising Alluvium, classified as a Secondary A aquifer.
- 7.1.40 The realignment of the 275kV overhead cables and new pylons in the amendment are located within the source protection zone (SPZ) for public water supply (PWS) source TH174 and TH177 (refer to map WR-02-007 in the main ES, Volume 5, Water Resources Map Book).
- 7.1.41 There is one licensed groundwater abstraction (GW42 as set out in Volume 5: Appendix WR-002-007, Section 3.3 of the main ES) within 250m of the diverted 275kV overhead cables. There are no recorded unlicensed abstractions (groundwater or surface water) within 1km of the site. However, there is the potential for unlicensed groundwater abstractions to exist, since a licence is not required for abstraction volumes below 20m³ per day.
- 7.1.42 Realignment of the diversion of overhead power lines and new pylons will pass over the Newyears Green Bourne near crossing SWC-CFA7-02 (refer to map WR-01-008 in the main ES, Volume 5, Water Resources Map Book). This Main River⁵ is not classified in the Thames River Basin Management Plan⁶. Therefore, the Water Framework Directive (WFD) status is assumed to be the same as the status of the first downstream water body for which a status class is reported. In this case, this would be

⁵ Water-feature classifications: Section 113 of the Water Resources Act 1991 defines a main river as a watercourse that is shown as such on a main river map. Section 72 of the Land Drainage Act 1991 defines an ordinary watercourse as 'a watercourse that is not part of a main river'. Section 221 of the Water Resources Act 1991 defines a watercourse as including 'all rivers and streams, ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers) and passages through which water flows'. Main rivers are larger rivers and streams designated by the Department for Environment, Food and Rural Affairs (Defra) on the main river map and are regulated by the Environment Agency.

⁶ Environment Agency (2009) River Basin Management Plan, Thames River Basin District.

the 'River Colne and Grand Union Canal from confluence with Chess to Ash' (Environment Agency water body reference GB106039023090) as shown in the main ES, Map WR-03-008, Volume 5, Water Resources and Flood Risk Assessment Map Book. The WFD status for the River Colne and Grand Union Canal is Poor potential with the objective for 2027 of Good potential. The Newyears Green Bourne is therefore assumed to be Poor potential under WFD and is classified as a high-value receptor.

Future baseline

Construction (2017)

- 7.1.43 All committed developments are required to comply with the National Planning Policy Framework (NPPF) development plans and other legislation and guidance. As such, committed developments are not expected to have a material effect on the water resources and flood risk baseline for construction.

Operation (2026)

- 7.1.44 For the reasons stated above for construction, committed developments are not expected to have a material effect on the water resources and flood risk baseline for operation.

Effects arising during construction

- 7.1.45 The main ES reported that if fissures connect the land required for the works associated with the Colne Valley viaduct directly to very high-value receptors such as PWS, the impact of even low levels of turbidity arising from groundworks, could cause the closure of PWS groundwater abstractions TH174 and TH177 due to the high quality required for potable use (refer to Volume 2, CFA7, Section 13.4).
- 7.1.46 Construction of the permanent pylons in the AP5 amendment is likely to involve piling up to 30m into the Chalk. The new pylon diversion route passes through SPZ2 of the PWS groundwater abstractions TH174 and TH177. Piling works could have the potential to impact on groundwater quality due to the migration of fluids or suspended bedrock particles giving rise to raised turbidity. If fissures connect the land required for the AP5 amendment directly to the PWS abstractions TH174 and TH177, the impact of low levels of turbidity will be major due to the high quality required to be met for potable use.
- 7.1.47 The impact of piling on abstraction TH174 will be similar to that presented in the main ES due to the construction of the Colne Valley Viaduct. However, the utilities diversion will result in a different temporary effect on this abstraction since the diversion occurs prior to the main construction works. This will not change the level of significance of the large adverse significant effect reported in the main ES.
- 7.1.48 In the SES3 and AP4 ES (Volume 2, Section 3.4), the piling associated with the temporary diversion of pylons at Denham Quarry and Dews Farm (SES3-007-002) identified the potential for large significant temporary effects on the PWS abstraction TH177. The potential impact of the piling work in this AP5 amendment is similar to that presented in Part 1 of the SES3 and AP4 ES. Therefore, the new pylons in this amendment will not give rise to a new or different effect on abstraction TH177 or

change the level of significance of the effects from those identified in the SES₃ and AP₄ ES.

- 7.1.49 Piling works could have the potential to impact on groundwater quality and surface water quality (where groundwater migrates to local surface water features). In the SES₃ and AP₄ ES (Volume 2, Section 3.4), the temporary diversion of pylons at Denham Quarry and Dews Farm assessed the impact of piling on water quality negligible with neutral effect and therefore not significant. The potential impact of the piling work in this AP₅ amendment is similar to that presented in the SES₃ and AP₄ ES, and therefore the proposed new pylons in this amendment will not give rise to a new or different effect or change the level of significance of the effects from those identified in the SES₃ and AP₄ ES.

Effects arising from operation

- 7.1.50 Realignment of the diversion of overhead power lines will not give rise to a new or different significant effect during operation and will not change the level of significance of the effects reported in the main ES or the SES₃ and AP₄ ES.

Mitigation and residual effects

- 7.1.51 No additional mitigation measures (i.e. in addition to those identified in the main ES and subsequent SES and AP ES reports) are required.
- 7.1.52 The additional land required for an overhead line diversion at Hillingdon Quarry will give rise to a different significant effect on PWS groundwater abstraction TH174 since the diversion occurs prior to the main construction works. However, this will not change the large temporary significant adverse effect reported in the main ES. The AP₅ amendment will not give rise to a new or different significant effect for PWS groundwater abstraction TH177, with the large significant temporary effect reported in Part 1 of the SES₃ and AP₄ ES remaining.
- 7.1.53 The main ES and the SES₃ and AP₄ ES reported that, in respect of PWS, HS₂ Ltd will agree a management strategy with the Environment Agency in consultation with Affinity Water, that will cover timing of any physical mitigation, the scale and nature of monitoring and the thresholds at which actions are invoked (in terms of both quality and flow), the nature of other intervention measures and the responsibilities for ensuring agreed actions occur. The AP₄ amendment (AP₄-007-003) provides land for temporary turbidity treatment equipment in the Colne Valley which will form part of the management strategy to remove, as far as practicable, these residual significant effects. However, until this management strategy is agreed with the Environment Agency, there is the potential for residual adverse significant effects associated with turbid groundwater reaching PWS groundwater abstractions TH174 and TH177.

Cumulative effects

- 7.1.54 There are no new or different likely significant cumulative temporary effects for water resources and flood risk assessment as a result of the AP₂ amendment (AP₂-007-002) as revised by the AP₅ amendment interacting with another AP₅ amendment or the AP₁, other AP₂ or AP₄ amendments or any relevant committed developments.

Summary of new or different likely residual significant effects as a result of the amendment

- 7.1.55 The additional land required for an overhead power line diversion at Hillingdon Quarry will give rise to a different significant effect on PWS groundwater abstraction TH174 as the diversion occurs prior to the main construction works, however this will not change the level of the significant effect reported in the main ES. A large significant temporary effect on PWS groundwater abstraction TH177 was reported in Part 1 of the SES3 and AP4 ES, and this is unchanged by the AP5 amendment.
- 7.1.56 HS2 Ltd is seeking to agree a management strategy with the Environment Agency, in consultation with Affinity Water, to remove as far as practicable these residual significant effects. However, until this management strategy is agreed there remains the potential for residual adverse significant effects associated with turbid groundwater reaching PWS groundwater abstractions TH174 and TH177.

7.2 Revised permanent diversion of Bridleway DEN/3 Ricks 002 near Denham (AP5-007-002)

- 7.2.1 The Bill provides for the temporary stopping up of Bridleway DEN/3 Ricks 002 at the Colne Valley viaduct north launch satellite compound (refer to maps CT-06-021 and CT-06-022-L1 in the main ES, Volume 2, CFA7 Map Book). A temporary alternative route for Bridleway DEN/3 Ricks 002 will be provided to the south of its existing alignment via the A412 Denham Way/North Orbital Road, DEN/38/1 and Tilehouse Lane for a period of approximately three years and six months, adding an additional 1km. It will then be permanently diverted approximately 150m to the south in order to pass under the route at the Colne Valley viaduct, adding 270m to the existing alignment. On the east side of the route the diverted PRow will pass between the railway embankment and landscape mitigation planting.
- 7.2.2 Since submission of the Bill, further consideration has been given to convenience and amenity for the users of the permanent diversion of Bridleway DEN/3 Ricks 002. The amendment locates the diverted bridleway on the east side of the route around the east side of the landscape mitigation planting, which is further from the route. The bridleway will be set back 2m from the edge of the landscape mitigation planting. An additional section of the bridleway, along the north of the landscape mitigation planting, will be stopped up. The permanent diversion will add approximately 200m to the current alignment of the bridleway, which is 70m shorter than the diversion proposed in the original scheme.
- 7.2.3 The amendment is within Bill limits. However, as it affects a bridleway it requires an amendment to the Bill.
- 7.2.4 The realignment of the permanent diversion of Bridleway DEN/3 Ricks 002 is not considered to make changes that require reassessment of environmental effects or changes to proposed mitigation, as set out in the main ES with respect to any environmental topic.

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8 Summary of changes in CFA10

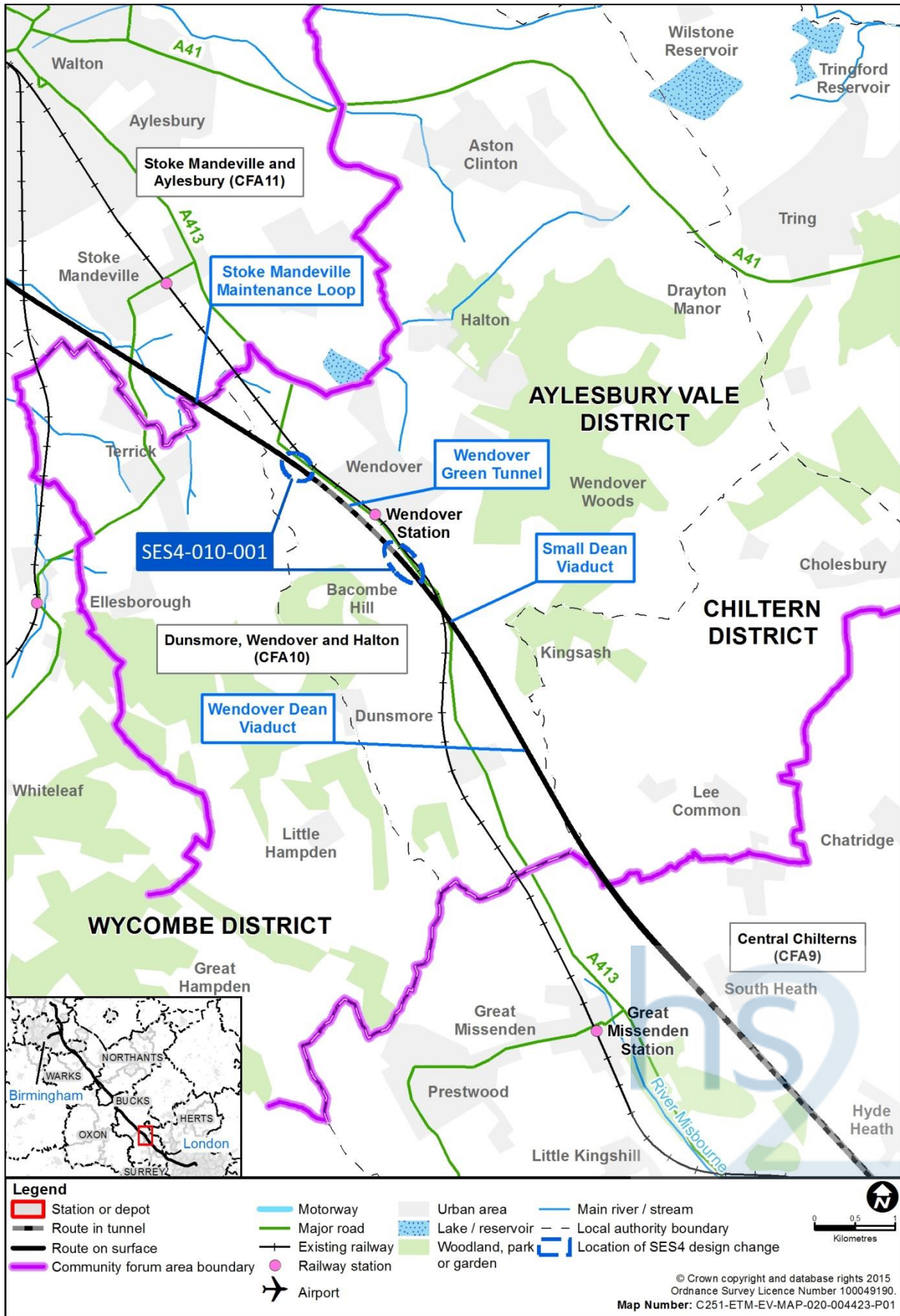
8.1 Changes to the design not requiring a change to the Bill

8.1.1 Table 4 provides a summary of the change to the design not requiring a change to the Bill which will result in new or different significant effects in the Dunsmore, Wendover and Halton area (CFA10). Figure 3 shows the location of the change.

Table 4: Summary of the change to the design not requiring a change to the Bill in CFA10

Name of design change	Description of the SES3 scheme	Description of the SES4 scheme
Provision of additional noise mitigation at Wendover (SES4-010-001)	The Bill provides for noise mitigation measures at the south of Wendover. Noise fence barriers (4m high) are proposed on both sides of the HS2 route, from the south of Small Dean viaduct to the south portal of the Wendover green tunnel.	Further consideration has been given to additional noise mitigation measures to reduce operational noise effects in Wendover. For the purposes of the assessment it has been assumed that this will be provided by extending the Wendover green tunnel southward by 100m; taller (6m) noise fence barriers at the southern portal; and additional 6m high noise fence barriers at the northern portal of the Wendover green tunnel. Earthworks would also be constructed along the HS2 route to reduce the visual impact of the noise fence barriers and green tunnel extension. As a consequence of these works there would need to be a permanent realignment of overhead power lines in this area.

Figure 3: Location of design change in CFA10



Description of changes to the design

Provision of additional noise mitigation at Wendover (SES4-010-001)

- 8.1.2 The Bill provides for noise mitigation measures to the south of Wendover. Noise fence barriers are proposed on both sides of the HS2 route, from the south of Small Dean viaduct to the south portal of the Wendover green tunnel⁷ (refer to maps CT-06-037 and CT-06-038 in the main ES, Volume 2, CFA10 Map Book).
- 8.1.3 Since the Select Committee statement published on 27 July 2015 regarding a potential southward extension of the Wendover green tunnel, consideration has been given to increasing the proposed noise mitigation measures at Wendover to reduce operational noise impacts. For the purposes of the assessment it is assumed that the revised mitigation measures will include construction of:
- an extension of the Wendover green tunnel southward by 100m;
 - a 6m high noise fence barrier approximately 780m in length along the eastern side of the route, between the Small Dean viaduct and the new location of the south portal, replacing the 4m high noise fence barrier proposed at this location in the SES3 scheme; and
 - a 6m high noise fence barrier located within the cutting at the northern portal of the Wendover green tunnel on the east side. This will run along the eastern edge of the access track and around the area where the portal buildings are situated, a distance of approximately 340m.
- 8.1.4 Earthworks would be constructed alongside the Wendover green tunnel south portal to reduce the visual impact of the noise fence barriers and extension of the green tunnel.
- 8.1.5 In addition, a revised realignment of 400kV overhead power lines across the HS2 route is required to address the construction constraints that would have occurred due to the new location of the extended green tunnel and higher noise barriers being in close proximity to the power line cables on the proposed alignment as described in the main ES. The revised permanent alignment proposed will approximately follow the existing power lines (refer to maps CT-05-038 and CT-06-038 in the SES4 and AP5 Map Book). Two new permanent pylons will be constructed: one to the west of the HS2 route, east of Grove Farm, and the second to the east of the route, near the new location of the south portal. All new pylons will be approximately 63m high. The overhead line will cross the HS2 route approximately 50m south of the current location.
- 8.1.6 The estimated duration of construction of the extension to the Wendover green tunnel is three months. The land required for this design change is within the original limits of the Bill and therefore no amendment to the Bill is required.

⁷ A cut-and-cover tunnel with soil spread on top to integrate into the landscape, thus minimising visual impacts and making the presence of a railway less noticeable. Access tracks and vegetation can be placed on the surface above the tunnel and it can be used for amenity, parkland and agricultural uses etc.

8.2 Topics included in the SES₄ assessment

- 8.2.1 The design change results in new or different significant effects in respect of: community, cultural heritage; and sound, noise and vibration. Reassessment was also considered to be required in respect of landscape and visual assessment and water resources and flood risk.

9 Assessment of changes in CFA₁₀

9.1 Community

Introduction

- 9.1.1 This section of the report describes the environmental baseline in relation to community that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change, compared to those of the SES₃ scheme.

- 9.1.2 Consideration is given to impacts on residential properties, community resources, amenity, open space and PRoW.

Scope, assumptions and limitations

- 9.1.3 The assessment scope, key assumptions and limitations for community are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Environmental baseline

Existing baseline

- 9.1.4 The town of Wendover is situated north of Great Missenden and south-east of Aylesbury, adjacent to the A₄₁₃ and the London Marylebone – Aylesbury train line. Most residential properties and community facilities are located to the east of the A₄₁₃ and train line, with the exception of some residences on Bacombe Lane and Ellesborough Road to the west (refer to Volume 2, CFA₁₀, Section 5 of the main ES).

Future baseline

Construction (2017)

- 9.1.5 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 5.3), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 9.1.6 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 5.3), the SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

Avoidance and mitigation measures

- 9.1.7 No avoidance or mitigation measures, additional to those reported in the main ES, are required.

Assessment of impacts and effects

Temporary effects

- 9.1.8 The main ES reported a major adverse significant effect on residential amenity for approximately five properties on Bacombe Lane due to a combination of significant visual effects and significant daytime noise effects. These effects were predicted to last for 16 months and were associated with the construction of the Wendover green tunnel.
- 9.1.9 The provision of additional noise mitigation at Wendover will increase the duration of the construction noise effects in this location by approximately three months. The five properties on Bacombe Lane will experience a combination of significant visual and noise effects for up to 19 months, compared to 16 months in the original scheme. This will give rise to a different significant effect on residential community amenity. However, this will not change the level of significance of the major adverse significant effect reported in the main ES.

Permanent effects

- 9.1.10 The proposed design change will not give rise to a new or different significant effect and will not change the level of the significance of the effects reported in the main ES.

Other mitigation measures

- 9.1.11 No changes to the mitigation measures reported in Volume 2, CFA10, Section 5 of the main ES are proposed.

Cumulative effects

- 9.1.12 There are no new or different likely significant cumulative effects for community as a result of the SES₄ change interacting with AP₁, AP₂ and AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 9.1.13 The provision of additional noise mitigation at Wendover will give rise to a different likely residual significant community amenity effect for five of the properties on Bacombe Lane, due to the extended duration of the construction noise. However, this will not change the level of significance of the major adverse significant effect reported in the main ES (refer to map CM-01-032 in the SES₄ and AP₅ ES, Volume 5 Map Book).

Effects arising from operation

- 9.1.14 The purpose of this design change is to achieve an improvement in noise mitigation at this location (refer to Section 9.4).

- 9.1.15 In terms of overall community effects, the conclusions of the main ES, which reported no significant operational community effects within this CFA, remain unchanged (refer to Volume 2, CFA₁₀, Section 5.5 of the main ES).

9.2 Cultural heritage

Introduction

- 9.2.1 This section of the report describes the environmental baseline in relation to cultural heritage relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change, compared to those of the SES₃ scheme.
- 9.2.2 Consideration is given to effects upon the value of heritage assets, including changes to their setting, as a result of the additional changes.

Scope, assumptions and limitations

- 9.2.3 The assessment scope, key assumptions and limitations for cultural heritage are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Environmental baseline

- 9.2.4 The cultural heritage baseline for the assessment takes into account information collected in support of the main ES, which included walk-over survey, geophysical survey, remote-sensing data, and data from national and local registers. A full list of heritage assets is provided in Volume 2, Section 6.3 of the main ES.
- 9.2.5 A summary of the baseline information relevant to the assessment of new or different effects is provided below. For those assets described in the main ES, further details are provided in the baseline reports, gazetteer of heritage assets, impact assessment tables and survey reports in Volume 5 of the main ES and are shown on maps CH-01 (Heritage Assets within Study Area), CH-02 (Designated Heritage Assets) and CH-03 (Archaeological Character Sub-zones), as updated in the SES and AP₂ ES, Volume 5 appendices.

Existing baseline

Designated assets

- 9.2.6 The amended noise mitigation described in this SES₄ change is located 160m southwest of the Wendover southern focus (asset reference DWH117)⁸. This group comprises the southern part of the town's conservation area and includes two Grade II* listed buildings, the first being St Mary's Church and the second being its lychgate⁹ and churchyard walls. It also includes three Grade II listed buildings all associated with Wendover House School. This part of Wendover has a wooded, village-like rural quality, which is a key element of its setting. The group is of high heritage value.

⁸ Asset reference: a unique code for each cultural heritage asset identified within the study area; further detail on these assets can be found in the gazetteer in Volume 5: Appendix CH-002-010 of the main ES and Volume 2, section 3.1 of the SES and AP₂ ES.

⁹ A gateway covered with a roof found at the entrance to a churchyard or burial ground.

- 9.2.7 Old Mill House (asset reference DWH118), a former mill, now converted into a cottage, is 385m north-east of the additional noise mitigation. This is a Grade II listed building of moderate heritage value. Its setting within an agricultural landscape contributes to its heritage value. Road noise from the A₄₁₃ is audible and detracts from the asset's rural setting, but does not affect the ability to appreciate the asset.

Non-designated assets

- 9.2.8 A complex of linear and rectilinear cropmarks identified on land between Bacombe Lane and Ellesborough Road (asset reference DWH116) are within the footprint of the area of land to be used for the additional landscaping for the extended green tunnel. These cropmarks may represent the location of buried remains associated with the site of a medieval chantry chapel hospital of St John the Baptist, although they may only represent former field boundary ditches or enclosure ditches. Any such surviving archaeological remains could contribute to the understanding of the medieval and post-medieval periods in the landscape of the Chiltern Scarp and Aylesbury Vale.

Future baseline

Construction (2017)

- 9.2.9 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 6.3), the SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 9.2.10 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 6.3), the SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

Avoidance and mitigation measures

- 9.2.11 No mitigation measures are required in addition to those identified in the main ES.

Assessment of impacts and effects

Temporary effects

- 9.2.12 The SES₄ design change to provide additional noise mitigation at Wendover will result in a comparable level of construction noise to that reported in the main ES, but for an extended duration of three months due to the extension to the green tunnel. The temporary medium adverse impact and a temporary major adverse significant effect for the Wendover southern focus (asset reference DWH117), and the temporary medium adverse impact and moderate adverse significant effect for Old Mill House (asset reference DWH118) reported in the main ES, remain unchanged. This is due to construction noise affecting the rural quality of the setting of the assets (asset references DWH117 and DWH118) such that their value is noticeably changed. Therefore there are no new or different significant temporary construction effects for cultural heritage as a result of the SES₄ design change, in comparison with the main ES.

Permanent effects

- 9.2.13 The main ES reported a permanent minimal adverse impact and minor adverse effect for the Wendover southern focus (asset reference DWH117) and a permanent low adverse impact and minor adverse effect for Old Mill House (asset reference DWH118) due to the construction of the Small Dean viaduct and associated overhead structures (refer to the main ES, Volume 5: Appendix CH-003-010). The provision of additional noise mitigation at Wendover will not result in additional changes to the setting of either the Wendover southern focus (asset reference DWH117) or Old Mill House (asset reference DWH118) when compared to the main ES. The minor adverse non-significant permanent construction effects, reported in the main ES, therefore remain unchanged for both assets.
- 9.2.14 The main ES reported a medium adverse impact and moderate adverse significant effect for the cropmarks on land between Bacombe Lane and Ellesborough Road (asset reference DWH116) due to approximately 50% of the cropmarks and any associated archaeological remains being removed. The SES₄ scheme will result in the same 50% of these cropmarks and any associated archaeological remains being removed.
- 9.2.15 There are no new or different significant permanent construction effects for cultural heritage as a result of the proposed SES₄ design change, in comparison with those described in the main ES.

Other mitigation measures

- 9.2.16 No changes to the mitigation measures reported in Volume 2, CFA10, Section 6 of the main ES are proposed.

Cumulative effects

- 9.2.17 There are no new or different likely significant cumulative effects for cultural heritage as a result of the SES₄ change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 9.2.18 The provision of additional noise mitigation at Wendover will not give rise to a new or different likely residual significant effect and will not change the level of significance of the effects reported in the main ES.

Effects arising from operation

Avoidance and mitigation measures

- 9.2.19 No mitigation measures are required in addition to those identified in the main ES.

Assessment of impacts and effects

- 9.2.20 In the main ES, a medium adverse impact and major adverse significant effect was reported for the Wendover southern focus (asset reference DWH117) and a medium adverse impact and moderate adverse significant effect was reported for Old Mill House (asset reference DWH118). This was due to the change in setting caused by the movement of trains and associated increase in noise. The additional noise mitigation

at Wendover will reduce operational noise caused by the movement of trains. It is considered that as a result of the additional noise mitigation, operational noise will not result in a significant adverse effect on the heritage values of the Wendover southern focus (asset reference DWH117), within which St Mary's Church is located, and Old Mill House (asset reference DWH118). As a result, the operation of the SES₄ scheme will have a different effect from that reported in the main ES with a minimal impact on the setting of both the assets, resulting in minor adverse non-significant effects for both Wendover southern focus (asset reference DWH117) and Old Mill House (asset reference DWH118).

Other mitigation measures

- 9.2.21 No changes to the mitigation measures reported in Volume 2, CFA10, Section 6 of the main ES are proposed.

Cumulative effects

- 9.2.22 There are no new or different likely significant cumulative effects for cultural heritage as a result of the SES₄ change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 9.2.23 The provision of additional noise mitigation at Wendover will result in a reduction in operational noise caused by the movement of trains when compared to that reported in the main ES. As a result, the operation of the SES₄ scheme will have a minimal impact on the setting of heritage assets, and the medium adverse impact and major adverse residual significant effect for the Wendover southern focus (asset reference DWH117) and the medium adverse impact and moderate residual adverse significant effect for Old Mill House (asset reference DWH118) reported in the main ES will be reduced to minor adverse non-significant effects (refer to Volume 5: Appendix CH-003-010 of the SES₄ and AP₅ ES).

9.3 Landscape and visual assessment

Introduction

- 9.3.1 This section of the report describes the environmental baseline in relation to landscape and visual assessment that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change, compared to those of the SES₃ scheme.
- 9.3.2 Consideration is given to the changes on landscape character and views and to the identification of new visual receptors, not previously included in the main ES, SES and AP₂ ES, and SES₃ and AP₄ ES.

Scope, assumptions and limitations

- 9.3.3 The assessment scope, key assumptions and limitations for landscape and visual assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES. Updates to the methodology for the landscape and visual assessment are also described in Volume 1 of the AP₁ ES and Volume 1 of the SES and AP₂ ES.

Environmental baseline

Existing baseline

Landscape baseline

- 9.3.4 A summary of the baseline information in the main ES relevant to the assessment of the SES₄ design change is provided below. Further details are provided in the main ES Volume 2, CFA₁₀, Section 9 and Volume 5: Appendix LV-001-010.
- 9.3.5 The design change is located within the Wendover Gap LCA and the Wendover Foothills (West) LCA and adjacent to the Settlement (Wendover) LCA and the Chiltern Scarp (Wendover West) LCA, as described in the main ES Volume 2, CFA₁₀, Section 9 and Volume 5: Appendix LV-001-010.

Visual baseline

- 9.3.6 The following viewpoints are located in close proximity and are described in the main ES (Volume 2, CFA₁₀, Section 9):
- Viewpoint 103.2.001: view south-east from dwellings on Ellesborough Road, Wendover;
 - Viewpoint 103.3.001: view north from the PRoW (Footpath WEN/13A) off Bacombe Lane;
 - Viewpoint 104.3.002: view south-west from the PRoW (Bridleway WEN/14) on Bacombe Lane, Wendover;
 - Viewpoint 105.2.001: view north from dwellings on Ellesborough Road, Wendover;
 - Viewpoint 105.2.002: view east from Wellwick Farm, Wendover;
 - Viewpoint 105.3.001: view north-east from the summit of Coombe Hill on the PRoW (Footpath ELL/64);
 - Viewpoint 105.3.002: view north-east from the Aylesbury Ring PRoW (Footpath WEN/6), west of Wendover;
 - Viewpoint 105.3.003: View east from the summit of Bacombe Hill on the PRoW (Footpath WEN/15C); and
 - Viewpoint 106.3.001: view south-west from the PRoW (Footpath WEN/54) to the west of Wendover.

Future baseline

Construction (2017)

- 9.3.7 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 9.3), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 9.3.8 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 9.3), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Temporary effects arising during construction

Avoidance and mitigation measures

- 9.3.9 The measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction remain as stated in the main ES (Volume 2, CFA₁₀, Section 9).

Assessment of impacts and effects

- 9.3.10 As defined in the main ES, this assessment of landscape and visual effects in construction has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works will take place.
- 9.3.11 As is commonplace with major infrastructure works, the scale of the construction activities means that works will be visible in many locations and will have the potential to give rise to significant temporary effects which cannot be mitigated practicably. For further details refer to the main ES (Volume 2, CFA₁₀, Section 9).

Landscape assessment

- 9.3.12 The main ES reported major adverse significant effects on the Wendover Gap LCA, the Wendover Foothills (West) LCA and the Chiltern Scarp (Wendover West) LCA, and moderate adverse significant effects on the Settlement (Wendover) LCA during construction. These were due to the construction of the green tunnel, the formation of cuttings up to approximately 15m deep and of embankments up to approximately 10m high, the emergence of new structures and the perceptible reduction in tranquillity.
- 9.3.13 The extent of the land required during construction remains largely as reported in the main ES. The additional work to extend the Wendover green tunnel, construct the noise fence barriers, construct earthworks bunds and realign the 400kV powerlines will be inconspicuous in the context of the large-scale construction works. This change will therefore not give rise to a new or different significant effect and will not change the level of significance of effects reported in the main ES.

Visual assessment

- 9.3.14 The main ES reported significant effects on a number of visual receptors due to the close proximity of construction activity, the presence of construction compounds and construction plant, the presence of temporary material stockpiles, the formation of cuttings and the Wendover green tunnel, and the removal of vegetation, opening up views. The visual receptors are (with the significance of effects reported in the main ES in brackets):
- Viewpoint 103.2.001: view south-east from dwellings on Ellesborough Road (major adverse significant effect);

- Viewpoint 103.3.001: view north from the PRoW (Footpath WEN/13A) off Bacombe Lane (major adverse significant effect);
- Viewpoint 104.3.002: view south-west from the PRoW (Bridleway WEN/14) on Bacombe Lane, Wendover (major adverse significant effect);
- Viewpoint 105.2.001: view north from dwellings on Ellesborough Road, Wendover (major adverse significant effect);
- Viewpoint 105.2.002: view east from Wellwick Farm, Wendover (moderate adverse significant effect);
- Viewpoint 105.3.001: view north-east from the summit of Coombe Hill on the PRoW (Footpath ELL/64) (moderate adverse significant effect);
- Viewpoint 105.3.002: view north-east from the Aylesbury Ring PRoW (Footpath WEN/6), west of Wendover (major adverse significant effect);
- Viewpoint 105.3.003: view east from the summit of Bacombe Hill on the PRoW (Footpath WEN/15C) (major adverse significant effect); and
- Viewpoint 106.3.001: view south-west from the PRoW (Footpath WEN/54) to the west of Wendover (moderate adverse significant effect).

9.3.15 The construction activity associated with the provision of additional noise mitigation at Wendover, which comprises the extension of the Wendover green tunnel and construction of the noise fence barriers, as well as the construction of the earthworks bunds and the realignment of 400kV power lines, will be viewed in the context of the large-scale works already taking place at the north and south portals of the Wendover green tunnel. It will not, therefore, result in the addition of new features or substantial changes to views. The design change will therefore not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES on the viewpoints listed above.

Other mitigation measures

9.3.16 To further reduce the significant effects described above, consideration of where planting can be established early in the construction programme will be given during the detailed design stage.

Cumulative effects

9.3.17 There are no new or different likely significant cumulative temporary effects for landscape and visual assessment as a result of the SES₄ design change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

9.3.18 The effects described above will be temporary and reversible in nature lasting only for the duration of the construction works. Any residual effects will generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed from surrounding residential receptors, and users of PRoW within the study area.

- 9.3.19 The additional construction activity associated with the provision of additional noise mitigation at Wendover will not give rise to a new or different likely residual significant effect and will not change the level of significance of the effects reported in the main ES.

Permanent effects arising during operation

Avoidance and mitigation measures

- 9.3.20 The operational assessment of impacts and effects is based on year 1 (2026), year 15 (2041) and year 60 (2086). A process of iterative design and assessment has been employed to avoid or reduce adverse effects during the operation of the SES₄ scheme. Landscape earthworks have been incorporated into the design of the SES₄ scheme and these measures have been taken into account in the assessment of the operational effects.

Assessment of impacts and effects

Landscape assessment

- 9.3.21 The main ES reported a moderate adverse significant effect in year 1 and year 15 of operation on the Wendover Gap LCA. The effect would reduce to non-significant by year 60 when mitigation planting would have established and integrated the new structures into the landscape. The effects reported were due to the introduction of new features into the landscape including engineered landforms, overhead line equipment, the tunnel portal, viaducts, bridges and noise fence barriers.
- 9.3.22 The green tunnel extension and the northern end of the noise fence barriers will be screened from the wider landscape by the enlarged landscape earthworks bunds. The porous portal has embankments that run parallel to the structure, reducing its perceived overall height and scale in the landscape. These measures will be effective in year 1 of operation. The 4m high noise fence barriers of the original scheme would have been substantial new structures in the landscape. In the SES₄ scheme, the taller barriers will be seen in the context of the large scale and open landscape and the other elements of the scheme. Consequently the 6m noise fence barriers will not be noticeably more prominent in the landscape than the 4m barriers of the original scheme. The additional pylons and small change in the route of the 400kV power lines will result in a barely noticeable change in the context of the scheme and the existing power infrastructure of the area. Woodland planting south of the line will help to integrate the SES₄ scheme into the LCA when established.
- 9.3.23 The provision of additional noise mitigation at Wendover will not result in a new or different significant effect and will not change the level of significance of the effect on the Wendover Gap LCA reported in the main ES.
- 9.3.24 The main ES reported a moderate adverse significant effect in year 1 and year 15 of operation on the Wendover Foothills (West) LCA. The effect would reduce to non-significant by year 60 when mitigation planting had established and integrated the new structures into the landscape. The effects reported were due to the introduction of new features into the landscape including engineered landforms, overhead line equipment, the tunnel portal, viaducts, bridges and noise fence barriers.

- 9.3.25 The additional noise mitigation within the Wendover Foothills (West) LCA will result in the introduction of a 6m high noise fence barrier, 340m long, running along the eastern edge of the access track and around the Wendover green tunnel north portal buildings. The noise fence barrier will be partly in cutting and partly on embankment.
- 9.3.26 The tunnel extension and the northern end of the noise fence barriers will be separated from the majority of the LCA, which is to the west, by the large-scale landscape earthworks bunds on the western side of the line, which will affect a small proportion of the LCA.
- 9.3.27 The provision of additional noise mitigation at Wendover will not give rise to a new or different significant effect and will not change the level of significance of the effect on the Wendover Foothills (West) LCA reported in the main ES.
- 9.3.28 The main ES reported non-significant adverse effects on the Settlement (Wendover) LCA (minor adverse in year 1, reducing to negligible by year 15 and through to year 60 of operation) and Chiltern Scarp (Wendover West) LCA (minor adverse in years 1 and 15, reducing to negligible by year 60 of operation) (refer to the main ES, Volume 5: Appendix LV-001-010).
- 9.3.29 The provision of additional noise mitigation at Wendover will be largely inconspicuous in these LCAs because the change will be largely screened by intervening development, transport infrastructure and vegetation. Consequently the proposed additional noise mitigation at Wendover will not give rise to a new or different significant effect and will not change the level of significance of the effect on the Settlement (Wendover) LCA and Chiltern Scarp (Wendover West) LCA in the main ES.

Visual assessment

- 9.3.30 The main ES reported significant effects on a number of visual receptors during operation due to the changes in landform, the presence of the Wendover green tunnel, the Bacombe Lane road realignment, the B4009 Nash Lee Road realignment and the removal of vegetation, opening up views. The visual receptors are (with the significance of effects reported in the main ES in brackets):
- Viewpoint 103.2.001: view south-east from dwellings on Ellesborough Road (major adverse effect in year 1 of operation, reducing to non-significant by year 15 and beyond);
 - Viewpoint 104.3.002: view south-west from the PRoW (Bridleway WEN/14) on Bacombe Lane, Wendover (major adverse effect in year 1 of operation, reducing to non-significant by year 15 and beyond);
 - Viewpoint 105.2.001: view north from dwellings on Ellesborough Road, Wendover (moderate adverse effect in year 1 of operation, reducing to non-significant by year 15 and beyond);
 - Viewpoint 105.3.001: view north-east from the summit of Coombe Hill on the PRoW (Footpath ELL/64) (moderate adverse effect in year 1 of operation, reducing to non-significant by year 15 and beyond); and
 - Viewpoint 105.3.003: view east from the summit of Bacombe Hill on the PRoW (Footpath WEN/15C) (moderate adverse effect in year 1 of operation, reducing

to non-significant by year 15 and beyond).

- 9.3.31 The main ES reported non-significant effects on the following receptors:
- Viewpoint 103.3.001: view north from the PRoW (Footpath WEN/13A) off Bacombe Lane (minor adverse in years 1, 15 and 60);
 - Viewpoint 105.2.002: view east from Wellwick Farm (minor adverse in year 1, negligible adverse by year 15 and minor beneficial by year 60);
 - Viewpoint 105.3.002: view north-east from the Aylesbury Ring PRoW (Footpath WEN/6), west of Wendover (minor adverse in years 1, 15 and 60); and
 - Viewpoint 106.3.001: view south-west from the PRoW (Footpath WEN/54) to the west of Wendover (negligible adverse in years 1, 15 and 60).
- 9.3.32 The extension of the green tunnel will move the tunnel portal further from Viewpoint 103.2.001: view south-east from dwellings on Ellesborough Road and the increased extent of the 3m high landscape earthworks bunds each side of the south porous portal of the green tunnel will partly screen the SES₄ scheme from here. The noise fence barriers will not be apparent from this location but the earthworks and landscape mitigation planting at the northern end of the tunnel will be visible in the distance. The additional pylon, between the tunnel portal and Grove Farm, will be a new feature in the view but one that is characteristic of the existing view because pylons are already visible.
- 9.3.33 The provision of additional noise mitigation at Wendover will not therefore result in a different effect on Viewpoint 103.2.001: view south-east from dwellings on Ellesborough Road and will not change the level of significance of the effects reported in the main ES.
- 9.3.34 The extension of the green tunnel and the increased extent of the 3m high landscape earthworks bunds each side of the south porous portal of the green tunnel will largely screen the design change from Viewpoint 103.3.001: view north from the PRoW (Footpath WEN/13A) off Bacombe Lane. The additional pylon, between the tunnel portal and Grove Farm, will be a new feature in this view, but one that is characteristic of the existing view because pylons are already visible. The design change will not therefore result in a new or different effect on Viewpoint 103.3.001: view north from the PRoW (Footpath WEN/13A) off Bacombe Lane and it will not change the level of significance of the effects reported in the main ES.
- 9.3.35 The extension of the green tunnel and the arrangement of the earthworks in the middle ground will be perceptible from Viewpoint 104.3.002: view south-west from the PRoW (Bridleway WEN/14) on Bacombe Lane, together with an increase in the height of the noise fence barrier south of the Wendover green tunnel. However, these features would have also been prominent in the view of the original scheme. The additional pylon, between the tunnel portal and Grove Farm, will also be a new feature in the view but one that is characteristic of the existing pylons in the view. The view is illustrated by photomontages showing the view from Bacombe Lane in year one (LV-01-051) and year 15 of operation (LV-01-235) in the SES₄ and AP₅, Volume 2 Map Book. The design change will result in a different effect on Viewpoint 104.3.002: view

south-west from the PRoW (Bridgeway WEN/14) on Bacombe Lane, Wendover in year 1 of operation. However, this will not change the level of significance of the effects reported in the main ES.

- 9.3.36 In views from Viewpoint 105.2.001: view north from dwellings on Ellesborough Road, Wendover, Viewpoint 105.3.001: view north-east from the summit of Coombe Hill on the PRoW (Footpath ELL/64) and viewpoint 105.3.003: View east from the summit of Bacombe Hill on the PRoW (Footpath WEN/15C), the 6m high noise fence barriers at the northern portal of the green tunnel will be perceptible as new features, but seen in the context of the new railway line and the tunnel portal buildings and the wider panoramic view from these locations. The SES₄ scheme will not give rise to a different significant effect on Viewpoint 105.3.001: View north-east from the summit of Coombe Hill on the PRoW (Footpath ELL/64) or viewpoint 105.3.003: View east from the summit of Bacombe Hill on the PRoW (Footpath WEN/15C) and will not change the level of significance of the effects reported in the main ES.
- 9.3.37 The 6m high noise fence barriers at the northern portal of the green tunnel will be screened from Viewpoint 105.3.002: view north-east from the Aylesbury Ring PRoW (Footpath WEN/6), west of Wendover and Viewpoint 105.2.002: view east from Wellwick Farm, Wendover by landscape earthworks west of the line. They will be largely screened by intervening vegetation along the A413 Nash Lea Road and the Marylebone to Aylesbury Line from Viewpoint 106.3.001: view south-west from the PRoW (Footpath WEN/54) to the west of Wendover. The SES₄ scheme will not give rise to a new or different significant effect on these receptors and will not change the level of significance of the effects reported in the main ES.

Other mitigation measures

- 9.3.38 The permanent effects of the SES₄ scheme on landscape and visual receptors have been further reduced through incorporation of additional woodland planting and landscape earthworks around the south portal of the green tunnel and additional landscape earthworks along the noise fence barriers, south of the south portal.
- 9.3.39 Effects in year 1 of operation may be further reduced by establishing planting early in the construction programme, which will be considered during the detailed design stage. This would provide additional screening and greater integration of the SES₄ scheme into the landscape.

Cumulative effects

- 9.3.40 There are no new or different likely significant cumulative permanent effects for landscape and visual assessment as a result of the SES₄ change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 9.3.41 As no other mitigation measures are considered practicable, the permanent likely residual significant effects during operation remain as above and as reported in the main ES. In most cases, significant effects will reduce over time as the proposed mitigation planting matures and reaches its designed intention.

- 9.3.42 The provision of additional noise mitigation at Wendover will not give rise to any new or different significant landscape and visual effects from operation, and will not change the level of the effects reported in the main ES.

9.4 Sound, noise and vibration

Introduction

- 9.4.1 This section of the report describes the environmental baseline in relation to sound, noise and vibration that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change compared to those of the SES₃ scheme. Consideration is given to the change in construction and operational noise and vibration.

Scope, assumptions and limitations

- 9.4.2 The assessment scope, key assumptions and limitations for the sound, noise and vibration assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.
- 9.4.3 Local assumptions and limitations for sound, noise and vibration are set out in the main ES (Volume 2, CFA₁₀).

Environmental baseline

Existing baseline

- 9.4.4 The existing baseline sound and vibration information for this area is described in the main ES (Volume 2, CFA₁₀, Section 11.2). Baseline sound levels representative of the assessment locations affected by the SES₄ design change have been used in the construction and operational assessments.

Future baseline

Construction (2017)

- 9.4.5 The future baseline for construction in 2017, and construction traffic in 2021, remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 11.2), the SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 9.4.6 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₁₀, Section 11.2), the SES and AP₂ ES (Volume 5 Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

Avoidance and mitigation measures

- 9.4.7 The avoidance and mitigation measures are presented in the main ES (Volume 2, CFA₁₀, Section 11).

Assessment of impacts and effects

- 9.4.8 In the vicinity of the additional noise mitigation at Wendover, the main ES reported that three residential buildings on Bacombe Lane were estimated to be likely to qualify for noise insulation. The main ES also reported a likely significant effect during construction around a group of approximately five dwellings on Bacombe Lane with a duration of 16 months (CSV10-Co1¹⁰, represented by assessment location ID 359406, in the main ES, Volume 5, Sound, noise and vibration Map Book, map series SV-03), approximately 50m from the SES₄ design change location. Significant construction noise effects were also identified in the main ES on a reasonable worst-case basis on the following non-residential receptors: Chiltern Way Federation School, Wendover Campus, Wendover (CSV10-No1, ID 370197) and St Mary's Church, Wendover (CSV10-No2, ID 369223) with durations of six months and 21 months respectively, approximately 250m to 300m from the SES₄ design change location.
- 9.4.9 These effects identified in the main ES are as a result of works associated with the construction of the Wendover green tunnel, particularly the most southern section in the vicinity of Bacombe Lane.
- 9.4.10 The design change involves the extension of the Wendover green tunnel by approximately 100m further south in the vicinity of Bacombe Lane. This extension therefore moves works associated with the construction of the green tunnel approximately 50m closer to Wendover House School (Chiltern Way Federation School, Wendover Campus, (ID 370197¹¹)) and St Mary's Church, Wendover (ID 369223). The extension of the length of the green tunnel will increase the length of construction of this section of the tunnel by approximately three months.
- 9.4.11 An assessment has been undertaken to determine whether construction noise or vibration from the SES₄ scheme will result in a new or different likely significant effect, using the methodology and significance criteria detailed in the main ES (Volume 5: Appendix SV-001-000).
- 9.4.12 Table 5 sets out the changes to the main ES, Volume 5: Appendix SV-003-010, construction assessment, sound, noise and vibration for both residential and non-residential receptors.

¹⁰ Construction noise effects that are considered significant when assessed on a community basis are identified with a unique identification number, CSVXX-CXX. Further detail on these effects can be found in Volume 5: Appendix SV003-010 of the main ES.

¹¹ See main ES, Volume 5, Sound, noise and vibration Map Book, map series SV-03.

Table 5: Assessment of construction noise at residential and non-residential receptors

Assessment location		Impact criteria			Construction activity resulting in highest forecast noise levels	Significance criteria								Significant effect	
ID	Area represented	Typical/highest monthly outdoor L_{pAeq} [dB] at the facade [Assessment category A/B/C]				Type of effect	Number of impacts	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]		Mitigation effect
		Day 0700- 1900	Evening 1900- 2300	Night 2300- 0700											
359406	Bacombe Lane, Wendover	69/75 [A]	-	-	Day: Wendover green tunnel: Phase 4 Section A – Reinstatement – Finishes/Embankment - Filling (Including Removal of Props)	A ¹²	3	R ¹³	T ¹⁴	-	-	-	D 19	NI ¹⁵	CSV ₁₀ – C ₀₁ ¹⁶
369223	Church Lane, Wendover	58/63	-	-	Day: Wendover green tunnel: Phase 4 Section A – Reinstatement – Finishes/Embankment - Filling (Including Removal of Props)	B ¹⁷	1	G ₃ ¹⁸	T	-	-	-	D 25	-	CSV ₁₀ – N ₀₂ ¹⁹

¹² Type of effect - adverse effect.

¹³ Type of receptor – residential.

¹⁴ Receptor design – typical.

¹⁵ Mitigation effect - identified as likely to qualify for noise insulation under the draft Construction Code of Practice (draft CoCP).

¹⁶ Significant effect – The adverse effects are considered significant when assessed on a community basis taking into account local context.

¹⁷ Type of effect - for non-residential receptors further detail about the type of effect is set out in the text of the main ES Appendix SV-001-000.

¹⁸ Type of receptor - places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls.

¹⁹ The pink cells in Table 5 indicate a significant effect identified at the referenced community or individual receptor.

- 9.4.13 The works associated with the design change result in an increase in the duration of noise impact of approximately three months at dwellings at Bacombe Lane, four months at St Mary's Church, Wendover (this includes one month of noise impact resulting from the works being closer to the church than in the main ES), and no changes to noise impacts at Chiltern Way Federation School, Wendover Campus, Wendover. These do not represent a substantial change from those reported in the main ES and consequently the design change will not give rise to a new or different significant effect in comparison with those reported in the main ES.

Other mitigation measures

- 9.4.14 No mitigation measures are proposed for construction noise and vibration other than those set out in the draft CoCP (Volume 5: Appendix CT-003-000).

Cumulative effects

- 9.4.15 This assessment has considered the potential cumulative construction noise effects of the SES₄ scheme and other committed developments. In the vicinity of the SES₄ changes, there are no further committed developments beyond that described in the main ES (a construction project at Chiltern Way Federation School, Wendover Campus, Church Lane, Wendover) that would be built at the same time. As discussed in the main ES, if the construction at the school coincides with that of the scheme then adverse noise effects may be prolonged or increased in magnitude at the following non-residential receptors:

- Wendover House School (Chiltern Way Federation School, Wendover Campus) on Church Lane, (CSV10- No1); and
- St Mary's Church on Church Lane (CSV10-No2).

- 9.4.16 There are no new or different likely significant cumulative effects for sound, noise and vibration as a result of the SES₄ design change acting in combination with any AP₁, AP₂ or AP₄ amendments.

Summary of likely residual significant effects

- 9.4.17 The SES₄ design change will not give rise to any new or different residual significant construction noise or vibration effects compared to those reported in the main ES.

Effects arising from operation

Avoidance and mitigation measures

- 9.4.18 The provision of additional noise mitigation at Wendover includes noise fence barriers that are taller than those included in the original scheme. This amends the mitigation identified within the main ES, CFA10, Volume 2, Section 11.

Assessment of impacts and effects

- 9.4.19 The original scheme estimated that three properties, Larkfield, Long Meadow, and Cobwebs, Bacombe Lane, Wendover were likely to qualify for discretionary noise insulation, and these were identified by the appropriate symbol on maps SV-01-019 and SV-02-019 (main ES, Volume 5, Sound, noise and vibration Map Book).

- 9.4.20 The original scheme identified a likely significant adverse noise effect on a community basis at approximately 10 dwellings in the vicinity of Bacombe Lane, identified as OSV10-Co3²⁰ on maps SV-01-019 and SV-02-019 (main ES, Volume 5, sound, noise and vibration Map Book).
- 9.4.21 The original scheme identified, on a precautionary basis, St Mary's Church, Wendover as being subject to a significant adverse operational noise effect denoted by OSV10-No1 on maps SV-01-019 and SV-02-019 (main ES, Volume 5, sound, noise and vibration Map Book).
- 9.4.22 An assessment has been undertaken to determine whether operational noise levels from the SES₄ scheme will result in a new or different likely significant effect, using the significance criteria detailed in the main ES (Volume 5, Appendix SV-001-000). The predicted operational sound and vibration levels as a result of the design change are presented in the SES₄ and AP₅ ES Appendix SV-004-010, with sound contours and residual significant effects shown on map series SV-01 and SV-02 in the SES₄ and AP₅ ES, Volume 5 Map Book.
- 9.4.23 The design change will reduce the operational airborne noise levels at the properties in the vicinity of Bacombe Lane to an extent that the properties Larkfield, Long Meadow and Cobwebs are no longer expected to be likely to qualify for noise insulation and the significant (when assessed on a community basis) adverse operational noise effect at Bacombe Lane is no longer likely.
- 9.4.24 With the additional noise mitigation, the noise levels at St Mary's Church are forecast to be reduced to a level of 60dB L_{pAFmax}²¹ during the pass-by of the HS2 trains and 64dB L_{pAFmax} during the pass-by of a train which just meets the noise levels stated in the Trans European Standard on Interoperability (TSI). Considering the ambient noise levels typically occurring at St Mary's Church during music performances of 59–64 dB L_{pAFmax}, the forecast maximum levels from train pass-bys are not considered likely to result in a significant adverse effect on activities in the church (including music performances). The presence of noise from HS2 trains would result in a negligible effect on the acoustic character surrounding St Mary's church. Therefore, the significant adverse operational noise effect identified at St Mary's Church is no longer likely as a result of this design change.

Other mitigation measures

- 9.4.25 No other mitigation measures during operation are proposed in relation to sound, noise and vibration in this area.

Cumulative effects

- 9.4.26 There are no new or different likely cumulative effects for sound, noise and vibration as a result of the SES₄ design change acting in combination with one another or with AP₁, AP₂ or AP₄ amendments, or as a result of any relevant committed development.

²⁰ Operational noise effects that are significant when assessed on a community basis are identified with a unique identification number, OSVXX-CXX. Further detail on these effects can be found in Volume 5: Appendix SV-004-010 of the main ES.

²¹ The maximum A-weighted sound pressure level, where F indicates that the level is measured using a sound level meter's fast time weighting. It can be used to represent the "peak" noise level of an event such as a passing train. It is generally used when assessing the likelihood of night-time sleep disturbance.

Summary of likely residual significant effects

- 9.4.27 The design change will reduce the operational airborne noise levels at the properties in the vicinity of Bacombe Lane to an extent that the properties Larkfield, Long Meadow and Cobwebs are no longer expected to be likely to qualify for noise insulation, and the significant (on a community basis) adverse operational noise effect at Bacombe Lane, (OSV10-Co3) is no longer likely to occur. Predicted operational airborne noise levels are also reduced such that the significant adverse operational noise effect identified in the main ES at St Mary's Church (OSV10-No1) is no longer likely (refer to maps SV-01-019 and SV-02-019 in the Volume 5 Map Book and to Volume 5: Appendix SV-004-010 of the SES₄ and AP₅ ES).

9.5 Water resources and flood risk assessment

Introduction

- 9.5.1 This section of the report describes the environmental baseline in relation to water resources and flood risk that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change, compared to those of the SES₃ scheme.

Scope, assumptions and limitations

- 9.5.2 The assessment scope, key assumptions and limitations for the water resources and flood risk assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Environmental baseline

Existing baseline

- 9.5.3 As mapped by the BGS, the principal geology underlying the site of the design change comprises Cretaceous Chalk of the New Pit Chalk and Holywell Nodular Chalk Formations (undifferentiated) (White Chalk subgroup), underlain by the Melbourn Rock Member, and the Zig Zag Chalk and West Melbury Marly Chalk Formations (undifferentiated). There are no mapped superficial deposits in this area. The Chalk formations are all classified as Principal Aquifers. Further details regarding the geology can be found in Volume 2, Appendix WR-002-010 of the main ES.
- 9.5.4 The extension of the Wendover green tunnel southwards is located within an area shown on the updated Flood Map for Surface Water (uFMfSW) to be at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event. Receptors with the potential to be affected by the SES₄ design change in this location include residential properties at Bacombe Lane (High Value receptors).
- 9.5.5 The 6m high noise fence barrier along the east side of the HS2 route crosses two dry valleys with areas shown on the uFMfSW to be at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event. Receptors with the potential to be affected by the SES₄ scheme in this location include Grove Farm, and residential properties at Bacombe Lane (high-value receptors).
- 9.5.6 The 6m high noise fence barrier located within the cutting to the north of Wendover green tunnel is located within an area shown on the uFMfSW to be at risk of flooding

in the 1 in 30 year return period (3.3% annual probability) rainfall event. Receptors with the potential to be affected by the SES₄ design change in this location comprise land in the immediate vicinity (Low Value receptors).

- 9.5.7 The proposed earthworks are located within an area shown on the uFMfSW to be at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event, with potential adverse impacts on upstream receptors, including residential properties at Bacombe Lane (High Value receptors).
- 9.5.8 Maximum recorded groundwater levels in winter 2000/1 (representing high regional groundwater levels) were 14.5m above ordnance datum (AOD), or approximately 5m below ground level (bgl) at the crossing with the A413, falling to 130m AOD, approximately 2m bgl, at Wendover Cricket ground. This suggests that groundwater levels will be above the level of ground disturbance for construction of the proposed permanent pylons to support the diverted overhead power line in this location.
- 9.5.9 There are five reported private licensed groundwater abstractions within 1km of the location of the diversion, as set out in the main ES Volume 5: Appendix WR-002-010 Table 3. The proposed permanent pylon construction will take place within the outer SPZ²² for licensed private abstractions GWA₂ and GWA₃ (as set out in Volume 5: Appendix WR-002-010).
- 9.5.10 There are no PWS boreholes or reported private unlicensed groundwater abstractions within 1km of the location of the proposed permanent utility diversion. There is the potential for further unlicensed abstractions to exist, as a licence is not required for abstraction volumes below 20m³ per day.
- 9.5.11 The area of the design change is not known to be at risk of flooding from rivers, groundwater or artificial sources. These sources are therefore excluded from the assessment. However, there are a number of dry valleys from the south-west that are shown on the uFMfSW as being at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event.

Future baseline

Construction (2017)

- 9.5.12 All committed developments are required to comply with the NPPF development plans and other legislation and guidance. As such, committed developments are not expected to have a material effect on the water resources and flood risk baseline for construction.

Operation (2026)

- 9.5.13 For the reasons stated above for construction, committed developments are not expected to have a material effect on the water resources and flood risk baseline for operation.

Effects arising during construction

²² The inner protection zone of a private water abstraction is defined as the 50-day travel time from any point below the water table to the source with a minimum 50m-radius and is equivalent to a PWS SPZ₁. The outer protection zone of a private water abstraction is defined by a 400-day travel time from a point below the water table and equivalent to SPZ₂ at a PWS.

Avoidance and mitigation measures

- 9.5.14 No avoidance or mitigation measures, additional to those reported in the main ES, are required.

Assessment of impacts and effects

- 9.5.15 The 6m high noise fence barrier along the east side of the route replaces a previously proposed 4m high noise fence barrier at the same location. As a result, the effect on flood risk will be unchanged.
- 9.5.16 The 6m high noise fence barrier located within the cutting to the north of Wendover green tunnel is located within an area shown on the uFMfSW to be at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event. However, the noise fence barrier will be contained wholly within other scheme elements for which the effect has already been assessed. Consequently, the noise fence barrier will not give rise to any new or different significant effects on the risk of flooding.
- 9.5.17 No new or different likely significant effects on groundwater resources, surface water resources or water dependent habitats have been identified relating to the proposed changes to noise barriers.
- 9.5.18 The extension of the Wendover green tunnel does not alter the crossing of the dry valley, and will be contained wholly within other scheme elements for which the effect has already been assessed. Consequently, the extension will have no new or different effects on the risk of flooding. No significant effects on groundwater resources, surface water resources or water dependent habitats have been identified relating to the proposed changes to noise barriers.
- 9.5.19 The installation of the permanent pylons is likely to involve piling within the Chalk. This work will take place in the outer SPZ of two private abstractions, (GWA2 and GWA3, as set out in the main ES Volume 5: Appendix WR-002-010 Water resources assessment and shown in Volume 5, Water Resources and Floor Risk Assessment Map Book of the main ES). These two abstractions are used to supply flow to the Grand Union Canal (Wendover Arm). Piling activities could have a moderate adverse impact on these private abstractions, leading to a moderate adverse effect, which is significant. In Part 1 of the SES3 and AP4 ES, the potential for significant effects on private water abstractions was identified. The installation of the permanent pylons for the new overhead power line diversion will not give rise to a new or different significant effect on these private abstractions or change the level of significance of the moderate adverse effects reported in the main ES or the SES3 and AP4 ES.
- 9.5.20 The existence of piles below the groundwater level could cause localised groundwater mounding due to groundwater flow being constricted between the pile groups. However, given the distance between the pylons and the scale of the Chalk aquifer, it is assessed that the piles will not significantly hinder groundwater flow and there will be negligible impact on groundwater flooding at the scale of the Mid-Chilterns Chalk and negligible impact on flow to local abstractions.
- 9.5.21 Notwithstanding the mitigation measures set out within the draft CoCP, groundwater quality in the Chalk aquifer and nearby spring fed watercourses has the potential to be affected by increased turbidity from piling and from construction of the proposed

earthworks, especially since construction will take place in shallow Chalk where fissuring is likely to be more frequent and fissures more likely to be enlarged. However, natural groundwater velocities are low and natural attenuation in the aquifer is likely. The impact on turbidity in the Chalk aquifer as a whole is therefore assessed to be negligible, with a neutral effect, which is not significant.

- 9.5.22 No other significant effects on groundwater resources or water dependent habitats have been identified during the construction stage. The main ES reported that the proposed utility diversion would not have any significant temporary adverse effects on surface water resources or flood risk. The design change will not give rise to a new or different significant effect on surface water or flood risk.
- 9.5.23 The proposed earthworks are located within an area shown on the uFMfSW to be at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event, with potential adverse impacts on upstream receptors, including residential properties at Bacombe Lane (high-value receptors). Additionally, a land drainage area, previously located between Grove Farm and Bacombe Lane, has been replaced by two drainage areas located to the rear of Bacombe Lane properties on the west-side of the SES₄ scheme, and to the south of Bacombe Lane on the east-side of the SES₄ scheme. Both are located within the dry valley identified as at risk of flooding as outlined above. The addition of earthworks and land drainage areas within the area shown to be at risk of flooding in the 1 in 30 year return period (3.3% annual probability) rainfall event could result in an increase in the extent of flooding upstream of the SES₄ scheme. However, in order to maintain continuity of flows surface water will be collected into the SES₄ scheme land drainage system and diverted to the culvert near Grove Farm which has been designed with sufficient capacity for both catchments. This arrangement is consistent with the original scheme and there will be no increased risk of flooding from this source downstream of the SES₄ scheme.
- 9.5.24 The design change is also not expected to restrict flood flows and will not increase the risk of flooding upstream of the route. As a result, there will be no new or different significant effect on flood risk as a result of the design change. No significant effects on groundwater resources, surface water resources or water dependent habitats have been identified during the construction stage relating to the proposed changes to earthworks.

Other mitigation measures

- 9.5.25 No additional mitigation measures (in addition to those identified in the main ES and subsequent SES reports) are required.

Cumulative effects

- 9.5.26 There are no new or different likely significant cumulative effects for water resources or flood risk as a result of the SES₄ design change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 9.5.27 The provision of additional noise mitigation at Wendover and change to overhead power lines (including the construction of two new pylons) will not give rise to a new

or different residual significant effect and will not change the level of significance of the residual effects reported in the main ES.

Effects arising from operation

- 9.5.28 The SES₄ changes do not change the operation of the scheme and so there are no new or different significant operation effects for water resources and flood risk as a result of the proposed SES₄ changes, in comparison with the effects described in the main ES, SES and AP₂ ES, or SES₃ and AP₄ ES.

CFA10 Part 2: Additional Provision 5 Environmental Statement

10 Summary of amendments in CFA10

- 10.1.1 There are no amendments proposed within the Dunsmore, Wendover and Halton area (CFA10).

CFA11 Part 1: Supplementary Environmental Statement 4

11 Summary of changes in CFA11

11.1 Changes to the design not requiring a change to the Bill

11.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES3.

11.2 Corrections to the main ES

11.2.1 Since submission of the SES3 and AP4 ES, the need for an additional correction in the contents of the main ES has been identified due to a factual inaccuracy that results in a different significant effect in the Stoke Mandeville and Aylesbury area. Table 6 gives the location of the correction in the main ES, the reason for the correction, replicates the text, where applicable provides revised text, and identifies whether the correction changes a significant effect reported.

Table 6: Summary of corrections to the main ES in CFA11

Reference in the main ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
Cultural heritage Paragraph 6.4.19, Volume 2, CFA11 of the main ES, and Table 1, Volume 5: Appendix CH-003-011 of the main ES	The assessment in the main ES was based on a section of approximately 50m in length of the Hartwell House perimeter estate wall being demolished. However the length of wall that should have been reported as being demolished is approximately 110m. Approximately 95m of the wall will be permanently removed for the construction of the SES4 scheme.	Table 1, Volume 5, Appendix CH-003-011 of the main ES states: approximately 50m of the perimeter wall of the parkland, which is considered to be curtilage listed, will be demolished during the construction of the Proposed Scheme. This will result in a disruption of the designated boundary of the Hartwell parkland.	Volume 2 is unchanged from the main ES. The Volume 5: Appendix CH-003-011 of the main ES is amended as follows: approximately 110 metres of the Hartwell House perimeter estate wall of the parkland, which is considered to be curtilage listed, will be demolished during the construction of the Proposed Scheme. This will result in a disruption of the perimeter estate wall of the Hartwell parkland.	The main ES reported a permanent major adverse significant effect on Hartwell Park. The difference in length of wall to be demolished will give rise to a different permanent effect. However, the level of the significant effect remains major adverse. The part of the wall removed temporarily (approximately 15m length) will be reinstated on completion of construction works. In advance of demolition and modification a programme of historic building investigation and recording will be undertaken.

CFA₁₁ Part 2: Additional Provision 5 Environmental Statement

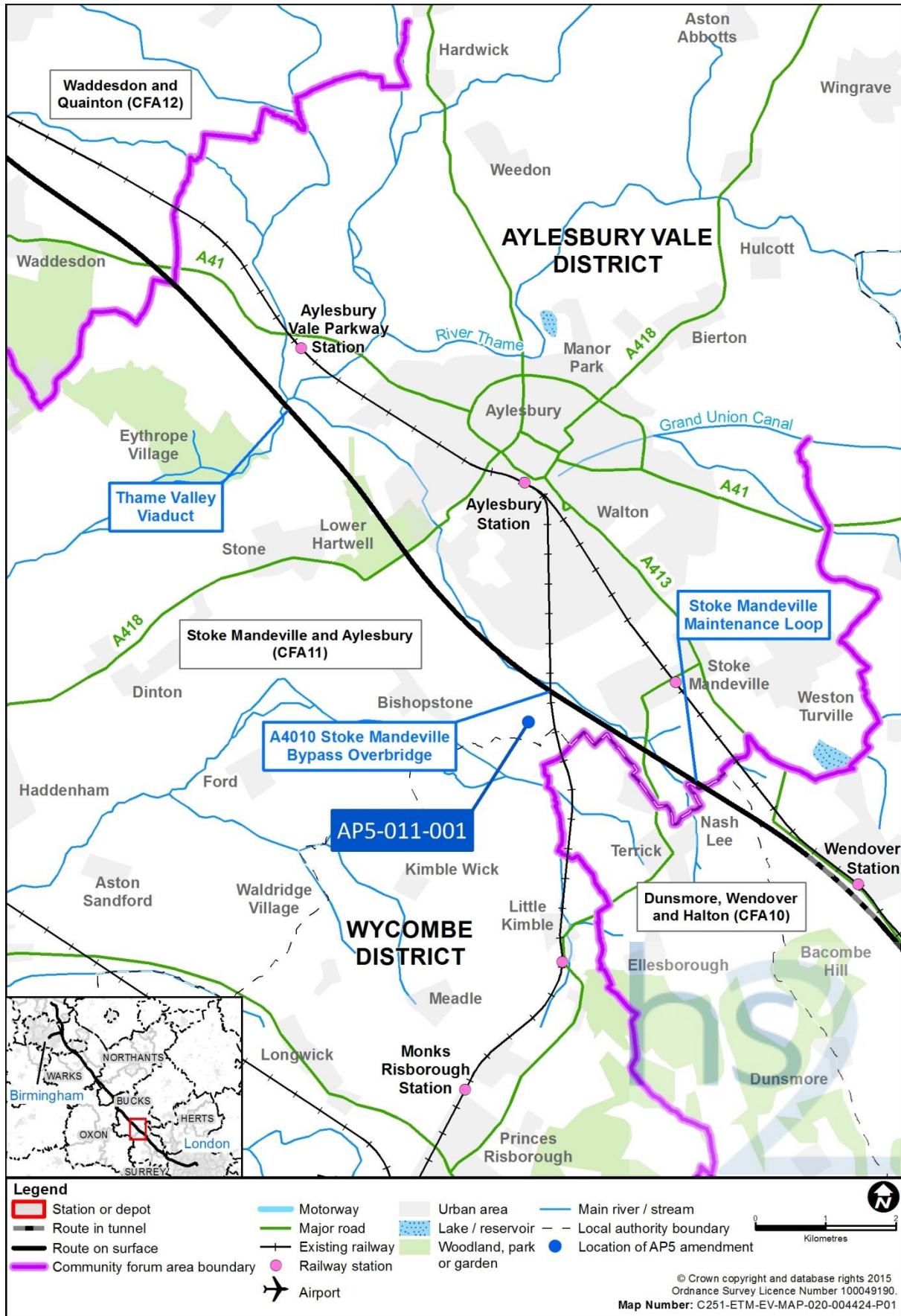
12 Summary of amendments in CFA₁₁

12.1.1 Table 7 provides a summary of the amendment in the Stoke Mandeville and Aylesbury area (CFA₁₁), and Figure 4 shows the location.

Table 7: Summary of amendment in CFA₁₁

Name of amendment	Description of the SES ₄ scheme	Description of the AP ₅ revised scheme
Additional land required for utility winching works near Aylesbury (AP ₅ -011-001)	The reconductoring and earthing of overhead power lines, at a pylon located approximately 220m north of Springfield Farm buildings.	Extension of the construction boundary at the pylon to provide a safe working area for reconductoring and earthing.

Figure 4: Location of amendment in CFA11



13 Assessment of amendments in CFA₁₁

13.1 Additional land required for utility winching works near Aylesbury (AP₅-011-001)

- 13.1.1 The Bill provides for land for reconductoring²³ and earthing²⁴ of overhead power lines. One pylon where reconductoring is necessary is located approximately 220m north of Springfield Farm buildings, near Aylesbury (refer to grid reference E5 in map CT-05-041-L1 of the main ES, Volume 2, CFA₁₁ Map Book).
- 13.1.2 Since submission of the Bill, further consideration has been given to the safe working area required for reconductoring and earthing. The amendment extends the construction boundary at the pylon by approximately 0.7ha (refer to grid reference E5 in map CT-05-041-L1 of the SES₄ and AP₅ ES, Volume 2 Map Book). The additional land is in an arable field and following construction, will be returned to its original use.
- 13.1.3 Localised vegetation clearance will be required for the reconductoring to maintain a safe working area and to prevent the conductor being damaged. With the exception of the vegetation clearance, the amendment will require no additional ground works.
- 13.1.4 The temporary use of this additional land is not considered to make changes that require reassessment of environmental effects or changes to proposed mitigation, as set out in the main ES, with respect to any environmental topic.

²³ Reconductoring is the process of installing or replacing conductors (or wires) on a section of overhead power line using winches.

²⁴ The earthing of conductors involves workers climbing the pylon and connecting an earthing bond (a thin wire connecting the conductor to the pylon earthing system) from the conductor to the earth plate on the tower to protect operatives working on the lines.

CFA₁₂ Part 1: Supplementary Environmental Statement 4

14 Summary of changes in CFA₁₂

14.1 Changes to the design not requiring a change to the Bill

- 14.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA, which will give rise to new or different significant environmental effects compared to those reported in the main ES, the SES or the SES₃.

CFA12 Part 2: Additional Provision 5 Environmental Statement

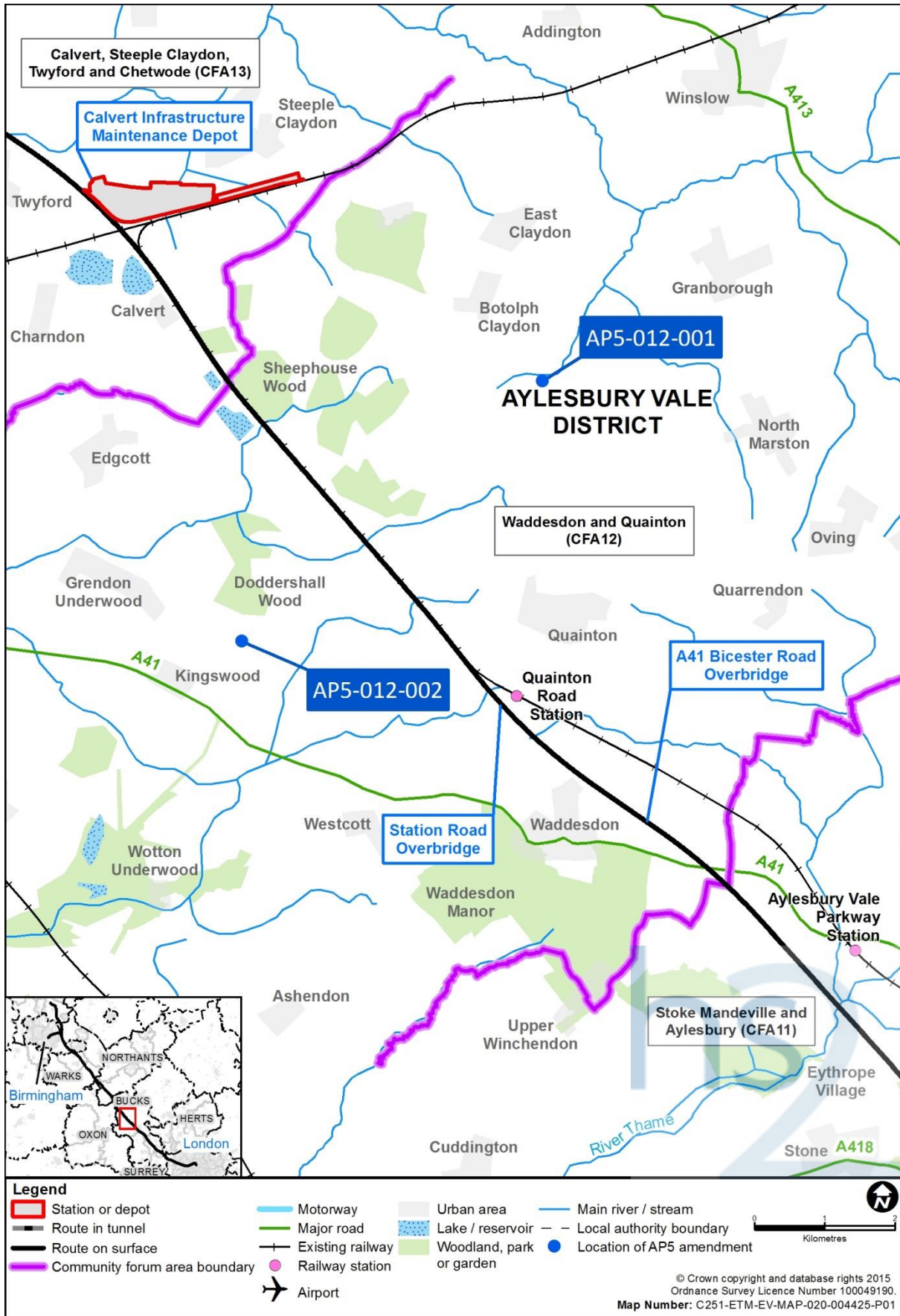
15 Summary of amendments in CFA12

15.1.1 Table 8 provides a summary of the amendments in the Waddesdon and Quainton area (CFA12), and Figure 5 shows the locations of the amendments.

Table 8: Summary of amendments in CFA12

Name of amendment	Description of the SES4 scheme	Description of the AP5 revised scheme
Additional land required for utility winching works near Botolph Claydon (AP5-012-001)	The reconductoring and earthing of overhead power lines, at a pylon located approximately 200m east of Borshaw Farm buildings, Botolph Claydon.	Extension of the construction boundary at the pylon to provide a safe working area for reconductoring and earthing.
Additional land required for utility winching works near Grendon Underwood (AP5-012-002)	The AP1 revised scheme includes the reconductoring and earthing of overhead power lines, at a pylon located approximately 100m east of the Lawn Farm Business Centre, Grendon Underwood as part of amendment AP1-012-015.	Extension of the construction boundary at the pylon to provide a safe working area for reconductoring and earthing. The AP5 amendment will only proceed if amendment AP1-012-015 is enacted.

Figure 5: Locations of amendments in CFA12



16 Assessment of amendments in CFA 12

16.1 Additional land required for utility winching works near Botolph Claydon (AP₅-012-001)

- 16.1.1 The Bill provides for land for reconductoring²⁵ and earthing²⁶ of overhead power lines. One pylon where reconductoring is necessary is located approximately 200m east of Borshaw Farm buildings, Botolph Claydon in CFA₁₂ (refer to grid reference E6 in map CT-05-051-R3 of the main ES, Volume 2, CFA₁₂ Map Book).
- 16.1.2 Since submission of the Bill, further consideration has been given to the safe working area required for reconductoring and earthing. The amendment extends the construction boundary at the pylon concerned by approximately 0.4ha (refer to grid reference E6 in map CT -05-051-R3 of the SES₄ and AP₅ ES, Volume 2 Map Book). The additional land is within an arable field and will be returned to its original use.
- 16.1.3 Localised vegetation clearance will be required for the reconductoring to maintain a safe working area and to prevent the conductor being damaged. With the exception of the vegetation clearance, the amendment will require no additional ground works.
- 16.1.4 The temporary use of this additional land is not considered to make changes that require reassessment of environmental effects or changes to proposed mitigation, as set out in the main ES, with respect to any environmental topic.

16.2 Additional land required for utility winching works near Grendon Underwood (AP₅-012-002)

- 16.2.1 The AP₁ revised scheme includes land for reconductoring and earthing of overhead power lines, as part of AP₁-012-015. One pylon where reconductoring is necessary is located approximately 100m east of the Lawn Farm Business Centre, Grendon Underwood in CFA₁₂ (refer to grid reference F₄ in map CT-05-052-L₃ of the AP₁ ES, Volume 2 Map Book part 3 of 6).
- 16.2.2 Since submission of the AP₁ ES, further consideration has been given to the safe working area required for reconductoring and earthing. The amendment extends the construction boundary at the pylon concerned by approximately 1.1ha (refer to grid reference F₄ in map CT-05-052-L₃ of the SES₄ and AP₅ ES, Volume 2 Map Book). The additional land is within an arable field and will be returned to its original use.
- 16.2.3 Localised vegetation clearance will be required for reconductoring to maintain a safe working area and to prevent the conductor being damaged. With the exception of the vegetation clearance, the amendment will require no additional ground works.
- 16.2.4 The AP₅ amendment will only proceed if amendment AP₁-012-015 is enacted.

²⁵ Reconductoring is the process of installing or replacing conductors (or wires) on a section of overhead power line using winches.

²⁶ The earthing of conductors involves workers climbing the pylon and connecting an earthing bond (a thin wire connecting the conductor to the pylon earthing system) from the conductor to the earth plate on the tower to protect operatives working on the lines.

- 16.2.5 The temporary use of this additional land is not considered to make changes that require reassessment of environmental effects or changes to proposed mitigation, as set out in the main ES, with respect to any environmental topic.

CFA13 Part 1: Supplementary Environmental Statement 4

17 Summary of changes in CFA13

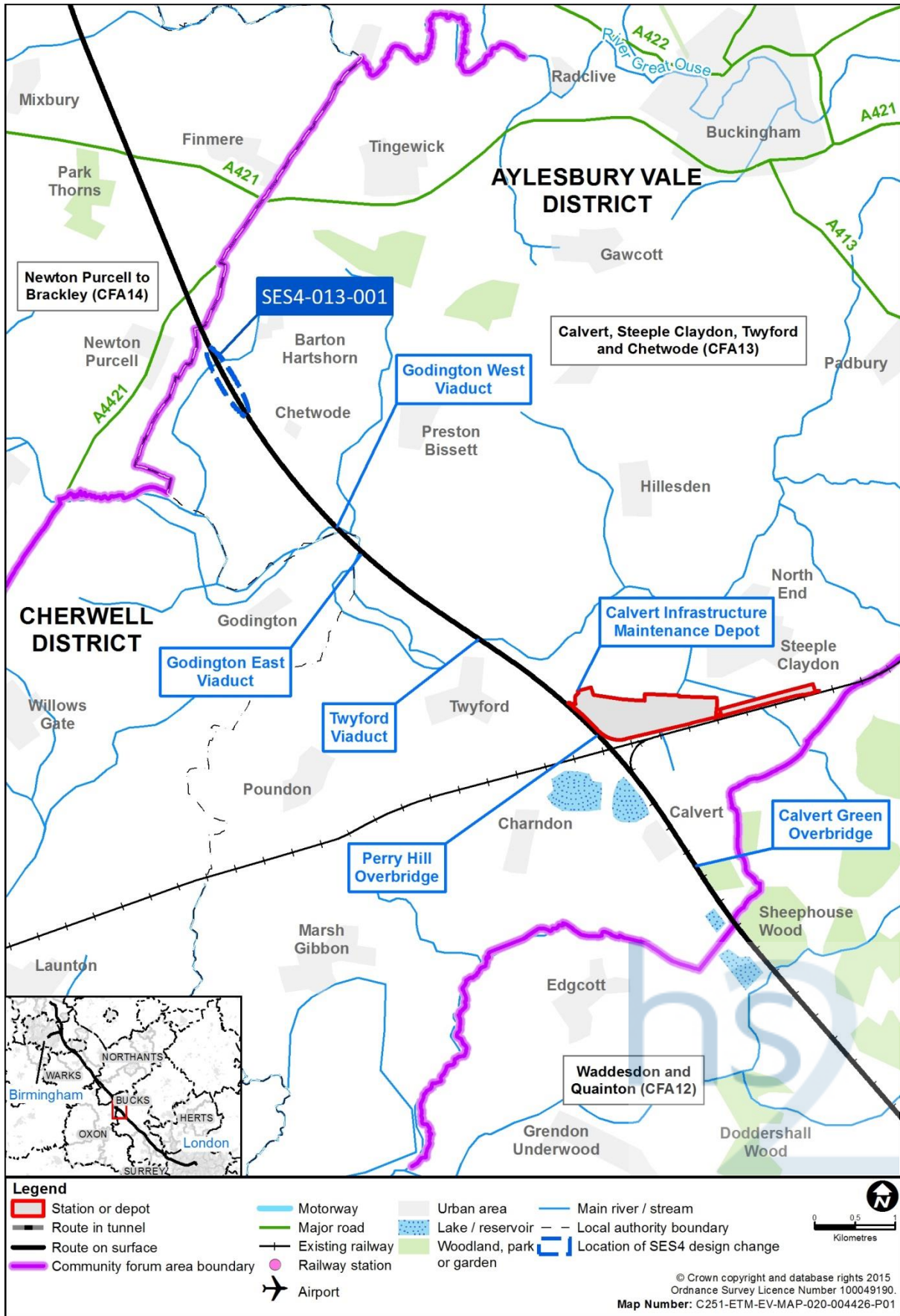
17.1 Changes to the design not requiring a change to the Bill

17.1.1 Table 9 provides a summary of the change to the design not requiring a change to the Bill which will result in new or different significant effects in the Calvert, Steeple Claydon, Twyford and Chetwode area (CFA13). Figure 6 shows the location.

Table 9: Summary of change to the design not requiring a change to the Bill in CFA13

Name of design change	Description of the SES3 scheme	Description of the SES4 scheme
Provision of additional noise mitigation at Chetwode (SES4-013-001)	The Bill provides for a 3m high noise fence barrier along the east of the HS2 route from Rosehill Farm to The Hermitage, Chetwode, a length of approximately 1km.	Further consideration has been given to additional noise mitigation measures to reduce operational noise effects in Chetwode. For the purposes of the assessment it has been assumed that this will be provided by an increase in the height of the noise fence barrier provided in the SES3 scheme (from 3m to 5m) and an extension to the noise fence barrier to the east of the HS2 route (for a length of approximately 1km, at a height of 5m) to provide a continuous barrier north to Barton Hartshorn Railway Wood.

Figure 6: Location of design change in CFA13



Description of changes to the design

Provision of additional noise mitigation at Chetwode (SES4-013-001)

- 17.1.2 The Bill provides for a 3m high noise fence barrier along the east of the HS2 route from Rosehill Farm to The Hermitage, Chetwode, for a length of approximately 1km (refer to maps CT-06-058 and CT-06-059 in the main ES, Volume 2, CFA13 Map Book). The HS2 route is in a cutting up to 10.5m deep along most of this length.
- 17.1.3 Since submission of the Bill, further consideration has been given to reducing operational noise in Chetwode. For the purposes of the assessment, it has been assumed that this will be provided by increasing the height of the noise fence barrier from 3m to 5m and incorporating an extended noise fence barrier 5m high on the east side of the HS2 route, from the northern extent of the raised barrier to a point approximately 1km to the north, at the Barton Hartshorn Railway Wood. This would provide a continuous noise fence barrier of approximately 2km in length shown from grid reference J7 in map CT-06-059 to grid reference F7 in map CT-06-060a in the SES4 and AP5 ES, Volume 2, CFA13 Map Book.
- 17.1.4 The estimated duration of construction of the noise mitigation measures is six months, which is the same as for the original scheme outlined in the main ES. The land required for this design change is within the original limits of the Bill and therefore no amendment to the Bill is required.
- 17.1.5 The design change results in new or different significant effects for community, cultural heritage, and sound, noise and vibration. Reassessment was also considered necessary with respect to the landscape and visual assessment.

18 Assessment of changes in CFA13

18.1 Community

Introduction

- 18.1.1 This section of the report describes the environmental baseline in relation to community that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change, compared to those of the SES3 scheme.
- 18.1.2 Consideration is given to impacts on residential properties, community resources, amenity, open space and PRoW.

Scope, assumptions and limitations

- 18.1.3 The assessment scope, key assumptions and limitations for community are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Environmental baseline

Existing baseline

- 18.1.4 Chetwode is a small hamlet located to the west of Preston Bisset and south-east of Netwon Purcell. It has one church (the Church of St Mary and St Nicholas). Most of the

residential properties in the hamlet are clustered around School End, with several outlying farmsteads.

Future baseline

Construction (2017)

- 18.1.5 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA₁₃, and Section 5.3), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 18.1.6 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₁₃, and Section 5.3), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

- 18.1.7 There are no new or different significant effects during construction for community as a result of the SES₄ design change, in comparison with the SES₃ scheme.

Effects arising during operation

Avoidance and mitigation measures

- 18.1.8 No avoidance or mitigation measures, additional to those reported in the main ES, are required.

Assessment of impacts and effects

- 18.1.9 The main ES reported a major adverse significant effect on residential amenity for up to 10 properties on School End in Chetwode arising from a combination of significant visual and noise effects due to the visibility of the School End overbridge and noise from passing trains.
- 18.1.10 The provision of additional noise mitigation at Chetwode will decrease the number of residential properties that are likely to experience a significant adverse operational noise effect. The number of properties that will experience significant residential amenity effects will therefore also decrease, from 10 properties to eight. This will give rise to a different significant effect on residential community amenity. However, this will not change the level of significance of the major adverse significant effect reported in the main ES.

Other mitigation measures

- 18.1.11 No changes to the mitigation measures reported in Volume 2, CFA₁₀, Section 5 of the main ES are proposed.

Cumulative effects

- 18.1.12 There are no new or different likely significant cumulative effects for community as a result of the SES₄ change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 18.1.13 The provision of additional noise mitigation at Chetwode will give rise to a different likely residual significant operational effect, through reducing the number of properties at School End that will experience significant community amenity effects (refer to map CM-01-043a in the SES₄ and AP₅ ES, Volume 5 Map Book). However, this will not change the level of significance of the major adverse significant effect reported in the main ES.

18.2 Cultural heritage

Introduction

- 18.2.1 This section of the report describes the environmental baseline in relation to cultural heritage relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the design change, compared to those of the SES₃ scheme.
- 18.2.2 Consideration is given to effects upon the value of heritage assets, including through changes to their setting, as a result of the SES₄ change.

Scope, assumptions and limitations

- 18.2.3 The assessment scope, key assumptions and limitations for cultural heritage are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Environmental baseline

Existing baseline

- 18.2.4 The cultural heritage baseline for the assessment takes into account information collected in support of the main ES, which included walk-over survey, geophysical survey, remote-sensing data, and data from national and local registers. A full list of heritage assets is provided in Volume 2, CFA₁₃, Section 6.3 of the main ES.
- 18.2.5 A summary of the baseline information relevant to the assessment of new or different effects is provided below. For those assets described in the main ES, further details are provided in the baseline reports, gazetteer of heritage assets, impact assessment tables and survey reports in Volume 5 of the main ES and are shown on maps CH-01 (Heritage Assets within Study Area), CH-02 (Designated Heritage Assets) and CH-03 (Archaeological Character Sub-zones).

Designated assets

- 18.2.6 Sunflower Farmhouse (asset reference CALo83)²⁷ lies 100m north-east of the additional noise mitigation proposed at Chetwode. This is a Grade II listed farmhouse of moderate heritage value set in an isolated position in an agricultural landscape: the retention of this historic relationship with its setting contributes to the asset's heritage value.

²⁷ Asset references refer to the gazetteer of heritage assets in Volume 5, Appendix CH-002-013 of the main ES.

- 18.2.7 The Hermitage (asset reference CAL093) is a Grade II listed building and is located 90m north-east of the design change. Its moderate heritage value lies in the asset's architectural character as an example of an 18th century rural residence along with its associated medieval earthworks. The asset's rural setting also contributes to its heritage value.
- 18.2.8 The Chetwode conservation area (asset reference CAL098) is an asset of high value, with the settlement of Chetwode being of potentially Saxon origin. It lies 50m north-east of the additional noise mitigation at its closest point, although most of the conservation area is over 250m to the north-east. A priory was established in Chetwode in the 13th century of which the Grade I listed Church of St Mary and St Nicholas (asset reference CAL117), a high-value heritage asset, is all that remains. The Church itself is 340m north-east of the additional noise mitigation. Priory House, a Grade II listed building built in approximately 1655 that forms part of the conservation area, sits adjacent to the Church and 325m to the north-east of the design change.

Non-designated assets

- 18.2.9 The additional noise mitigation crosses a hedgerow complex north of Barton Hill Farm (asset reference CAL126). This is an asset of low heritage value. The additional noise mitigation also runs through the Chetwode historic landscape (asset reference CAL127), an asset of low heritage value.

Future baseline

Construction (2017)

- 18.2.10 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA13, and Section 6.3), the SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 18.2.11 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA13, and Section 6.3), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

Avoidance and mitigation measures

- 18.2.12 No avoidance or mitigation measures, additional to those reported in the main ES, are required.

Assessment of impacts and effects

Temporary effects

- 18.2.13 The SES₄ design change will result in a comparable level of construction noise, movement of plant and construction activity when compared to the SES₃ scheme. A medium adverse impact and significant major adverse effect was reported in the main ES for the Church of St Mary and St Nicholas (asset reference CAL117). The impact was a result of the temporary disturbance of the church's quiet rural setting by construction activities, particularly the excavation of the cutting and construction of screening bunds. This effect remains unchanged.

- 18.2.14 In the main ES, medium adverse impacts and moderate adverse significant effects were reported for Sunflower House (asset reference CALo83) and The Hermitage (asset reference CALo93). As the assets will still be surrounded by the land required for the SES₄ scheme, the significant effects will remain.
- 18.2.15 The low temporary adverse impact and significant moderate adverse effect reported in the main ES for Chetwode conservation area (asset reference CALo98) remains unchanged. No temporary significant effects were reported for Chetwode historic landscape (asset reference CAL127) in the main ES; this also remains unchanged.

Permanent effects

- 18.2.16 No permanent significant effects were reported in the main ES for Chetwode conservation area (asset reference CALo98), Chetwode historic landscape (asset reference CAL127) or the Church of St Mary and St Nicholas (asset reference CAL117). Medium adverse impacts in the main ES were reported for Sunflower Farmhouse (asset reference CALo83) and The Hermitage (asset reference CALo93) resulting in moderate adverse significant effects due to the change in setting as a result of their proximity to the HS₂ route and the construction of large bunds overlooking the assets. A high adverse impact and moderate adverse significant effect was reported in the main ES for the hedgerow complex north of Barton Hill Farm (asset reference CAL126) as the majority of hedgerows would be removed.
- 18.2.17 The increase in height and length of the noise fence barriers will not appreciably change the overall impact of the SES₄ scheme on the setting of the assets when compared with the SES₃ scheme, as they will be largely concealed within the cutting and screened by bunds. The SES₄ design change will therefore not give rise to a new or different significant effect for Chetwode conservation area (asset reference CALo98), Chetwode historic landscape (asset reference CAL127) or the Church of St Mary and St Nicholas (asset reference CAL117), and will not change the level of significance of the non-significant effects reported in the main ES. The significant permanent construction effects reported in the main ES for Sunflower Farmhouse (asset reference CALo83), The Hermitage (asset reference CALo93) and the hedgerow complex north of Barton Hill Farm (asset reference CAL126) therefore remain unchanged.

Other mitigation measures

- 18.2.18 No mitigation measures are required in addition to those identified in the main ES and subsequent SES reports.

Cumulative effects

- 18.2.19 There are no new or different likely significant cumulative temporary effects for cultural heritage as a result of the SES₄ design change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 18.2.20 The construction of the additional noise mitigation will not give rise to a new or different likely residual significant effect and will not change the level of significance of the effects reported in the main ES.

Effects arising from operation

Avoidance and mitigation measures

- 18.2.21 No avoidance or mitigation measures, additional to those reported in the main ES, are required.

Assessment of impacts and effects

- 18.2.22 In the main ES, significant operational effects were reported for Chetwode conservation area (asset reference CAL098) and the Church of St Mary and St Nicholas (asset reference CAL117), with medium adverse impacts and major adverse significant effects. Sunflower Farmhouse (CAL083) and The Hermitage (CAL093) also reported medium adverse impacts and moderate adverse significant effects. These reported significant effects were caused by the movement of trains and the associated increase in noise affecting the heritage setting of the assets.
- 18.2.23 The increase in height to 5m and the 1km extension of the noise fence barriers will reduce the operational noise caused by the movement of trains to the extent that the impact will be reduced for the Church of St Mary and St Nicholas (asset reference CAL117) resulting in a change to the significant effect, to a low adverse impact and moderate adverse significant effect.
- 18.2.24 The additional noise mitigation will give rise to a different significant effect for Sunflower Farmhouse (asset reference CAL083), the Hermitage (asset reference CAL093) and Chetwode conservation area (asset reference CAL098), reducing the noise associated with the movement of trains. However, this will not change the level of significance of the effects reported in the main ES as despite the overall reduction, the noise effect associated with passing trains will still be significant.

Other mitigation measures

- 18.2.25 No mitigation measures are required in addition to those identified in the main ES and subsequent SES reports.

Cumulative effects

- 18.2.26 There are no new or different likely significant cumulative temporary effects for cultural heritage as a result of the SES4 design change interacting with the AP1, AP2 or AP4 amendments or any relevant committed development.

Summary of likely residual significant effects

- 18.2.27 The additional noise mitigation proposed at Chetwode will result in a reduction in noise caused by the movement of trains when compared to the main ES. The noise impact on the heritage setting will be reduced for the Church of St Mary and St Nicholas (asset reference CAL117) resulting in a change to the level of the residual significant effect, from moderate to low adverse impact and from major to moderate adverse significant residual effect. The additional noise mitigation will reduce the noise associated with the movement of trains for Sunflower Farmhouse (asset reference CAL083), the Hermitage (asset reference CAL093) and Chetwode conservation area (asset reference CAL098), giving rise to a different significant effect. However, this will not change the level of impact and residual moderate adverse significant effects reported in the main ES.

18.3 Landscape and visual assessment

Introduction

- 18.3.1 This section of the report describes the environmental baseline in relation to landscape and visual that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the changes introduced in Section 2, compared to those of the SES₃ scheme.
- 18.3.2 Consideration is given to the changes on landscape character and views and to the identification of new visual receptors, not previously included in the main ES, SES and AP₂ ES, or SES₃ and AP₄ ES.

Scope, assumptions and limitations

- 18.3.3 The assessment scope, key assumptions and limitations for landscape and visual assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES. Updates to the methodology for the landscape and visual assessment are also described in Volume 1 of the AP₁ ES and Volume 1 of the SES and AP₂ ES.

Environmental baseline

Existing baseline

- 18.3.4 A summary of the baseline information in the main ES relevant to the assessment of the SES₄ design change is provided below. Further details are provided in the main ES Volume 2, CFA₁₃, Section 9 and Volume 5: Appendix LV-001-013. Maps are provided in the main ES, Volume 5, Landscape and Visual Map Book.
- 18.3.5 The additional noise mitigation proposed at Chetwode is located within the Preston Bissett Plateau Edge LCA and adjacent to the Twyford Vale LCA.
- 18.3.6 The following viewpoints are located in close proximity and are described in the main ES (Volume 2, CFA₁₃, Section 9 and Volume 5: Appendix LV-001-013):
- Viewpoint 163.3.001: view north-east from PRoW (Footpath CHW/18) south of Manthorn Farm;
 - Viewpoint 164.2.001: view south-west from 'The Green', Chetwode;
 - Viewpoint 164.4.001: view south from PRoW south-east of Chetwode;
 - Viewpoint 165.2.001: view north-east from Barton Hill Farm;
 - Viewpoint 165.4.001: view north east from School End, west of Chetwode;
 - Viewpoint 166.2.001: view south-west from School End, Chetwode; and
 - Viewpoint 166.2.003: view west from School End, Chetwode.

*Future baseline***Construction (2017)**

- 18.3.7 The future baseline for construction in 2017 remains unchanged from that reported in the main ES (Volume 2, CFA13, Section 9), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 18.3.8 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA13, Section 9), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Temporary effects arising during construction*Avoidance and mitigation measures*

- 18.3.9 The measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction remain as stated in the main ES (Volume 2, CFA13, Section 9).

Assessment of impacts and effects

- 18.3.10 As defined in the main ES, this assessment of landscape and visual effects in construction has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works will take place.
- 18.3.11 As is commonplace with major infrastructure works, the scale of the construction activities means that works will be visible in many locations and will have the potential to give rise to significant temporary effects which cannot be mitigated practicably. For further details refer to the main ES (Volume 2, CFA13, Section 9).

Landscape assessment

- 18.3.12 The main ES reported a major adverse significant effect on the Preston Bissett Plateau Edge LCA during construction, due to the works associated with the formation of the Chetwode cutting (up to 10.5m deep and 1.9km long), the construction of the large earthwork mound associated with the Footpath BHA/2 overbridge, the presence of the Chetwode cutting satellite compound, the removal of hedgerows and woodland at Manthorn Farm and a reduction in tranquillity.
- 18.3.13 The additional noise mitigation proposed at Chetwode, which is within the Preston Bissett Plateau Edge LCA, will not give rise to a new or different significant effect as the scale of the construction activity and extent of the land required during construction will remain largely as reported in the main ES. The level of significance of the effects on the Preston Bissett Plateau Edge LCA will therefore remain as reported in the main ES.
- 18.3.14 The main ES reported a major adverse significant effect on the Twyford Vale LCA due to the presence of construction plant, construction activity, the removal of hedgerows and a reduction in tranquillity.

- 18.3.15 The additional noise mitigation proposed at Chetwode will be constructed outside, but adjacent to the Twyford Vale LCA. It will not give rise to a new or different significant effect as the scale of the construction activity associated with the SES₄ design change will remain largely as reported in the main ES. The level of significance of the effects on the Twyford Vale LCA will remain as reported in the main ES.

Visual assessment

- 18.3.16 The main ES reported significant effects on a number of visual receptors due to close views of construction activity on the Chetwode cutting and the Footpath CHW/18, School End and Footpath BHA/2 overbridges, the presence of material stockpiles and the Chetwode cutting satellite compound in the view and the removal of hedgerows and woodland. The visual receptors are (with the significance of the effects reported in the main ES in brackets):

- Viewpoint 163.3.001: view north-east from PRoW (Footpath CHW/18) south of Manthorn Farm (major adverse significant effect);
- Viewpoint 164.2.001: view south-west from 'The Green', Chetwode (major adverse significant effect);
- Viewpoint 164.4.001: view south from PRoW south-east of Chetwode (moderate adverse significant effect);
- Viewpoint 165.2.001: view north-east from Barton Hill Farm (major adverse significant effect);
- Viewpoint 165.4.001: view north east from School End, west of Chetwode (major adverse significant effect);
- Viewpoint 166.2.001: view south-west from School End, Chetwode (moderate adverse significant effect); and
- Viewpoint 166.2.003: view west from School End, Chetwode (major adverse significant effect).

- 18.3.17 The additional noise mitigation proposed at Chetwode will result in a small increase in construction activity west of Barton Hartshorn Railway Wood, where the noise mitigation barriers are proposed to be extended. The additional activity will be viewed in the context of the large-scale works (including the installation of noise fence barriers) already taking place in this location and will, therefore, be inconspicuous in the wider view. The additional noise mitigation will therefore not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES on the viewpoints listed in the paragraph above.

Other mitigation measures

- 18.3.18 To further reduce the significant effects described above, consideration of where planting can be established early in the construction programme will be given during the detailed design stage.

Cumulative effects

- 18.3.19 There are no new or different likely significant cumulative temporary effects for landscape and visual assessment as a result of the SES₄ design change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 18.3.20 The additional noise mitigation proposed at Chetwode will not give rise to a new or different likely residual significant effects and will not change the level of significance of the effects reported in the main ES.

Permanent effects arising during operation

Avoidance and mitigation measures

- 18.3.21 The operational assessment of impacts and effects is based on year 1 (2026), year 15 (2041) and year 60 (2086). A process of iterative design and assessment has been employed to avoid or reduce adverse effects during the operation of the SES₄ scheme.

Assessment of impacts and effects

Landscape assessment

- 18.3.22 The main ES reported a moderate adverse significant effect in year 1 of operation on the Preston Bissett Plateau Edge LCA due to the presence of the Chetwode auto-transformer station, the Barton Hartshorn embankment (up to 4m high) and the Footpath CHW/18, School End and Footpath BHA/2 overbridges in the landscape. The effect would be reduced to non-significant by year 15 and onwards when the mitigation planting had matured sufficiently to integrate the new elements into the landscape.
- 18.3.23 With the additional noise mitigation proposed at Chetwode, the noise fence barrier will be a new landscape feature in the stretches of the Chetwode cutting less than 5m deep, or where the HS2 route is at ground level or on the embankment. This will affect three short sections of the HS2 route west of Chetwode and Barton Hartshorn Railway Wood. The noise barrier will be situated in the railway corridor and in that context it will not be an incongruous new feature in the LCA in comparison with the SES₃ scheme. The SES₄ design change will therefore not give rise to a new or different significant effect and will not change the level of significance of the effect on the Preston Bissett Plateau Edge LCA reported in the main ES.
- 18.3.24 The main ES reported a major adverse significant effect in year 1 of operation on the Twyford Vale LCA due to the presence of the new railway line, engineered landforms, the Twyford viaduct, noise fence barriers, overbridges and sustainable placement area. The effect would be reduced to moderate adverse by year 15 and non-significant by year 60 when mitigation planting had matured.
- 18.3.25 As a result of the proposed increased height of the noise fence barrier, a short section will be apparent in the landscape outside, but close to, the boundary of the LCA south of Rosehill Farm. The noise fence barrier will be situated among other elements of the SES₄ scheme and in that context it will not be an incongruous new feature in the LCA. The SES₄ design change will not give rise to a new or different significant effect and

will not change the level of significance of the effect on the Twyford Vale LCA reported in the main ES.

Visual assessment

- 18.3.26 The main ES reported significant effects on a number of visual receptors due to close views of the Chetwode cutting and the Footpath CHW/18, School End and Footpath BHA/2 overbridges and due to the loss of roadside vegetation. The visual receptors are (with the significance of effects reported in the main ES in brackets):
- Viewpoint 163.3.001: view north-east from PRoW (Footpath CHW/18) south of Manthorn Farm (major adverse in years one, 15 and 60);
 - Viewpoint 164.2.001: view south-west from 'The Green', Chetwode (moderate adverse in year 1, reducing to non-significant by year 15 and onwards);
 - Viewpoint 165.4.001: view north east from School End, west of Chetwode (moderate adverse in year 1, reducing to non-significant by year 15 and onwards); and
 - Viewpoint 166.2.001: view south-west from School End, Chetwode (moderate adverse in year 1, reducing to non-significant by year 15 and onwards).
- 18.3.27 The main ES reported non-significant effects on a number of visual receptors close to the original scheme. Effects were assessed as non-significant because the view of the scheme from these locations would be largely screened in deep cutting, or due to the screening effect of intervening vegetation and mitigation earthworks. These were:
- Viewpoint 164.4.001: view south from PRoW south-east of Chetwode;
 - Viewpoint 165.2.001: view north-east from Barton Hill Farm; and
 - Viewpoint 166.2.003: view west from School End, Chetwode.
- 18.3.28 The SES₃ scheme included a 3m high noise fence barrier along the east of the HS₂ route from Rosehill Farm to The Hermitage, which would be largely screened from view by cuttings. The additional noise mitigation proposed at Chetwode will be a continuous linear feature in the form of a noise barrier 5m high above track level from Rosehill Farm to the Barton Hartshorn Railway Wood. As a result of the SES₄ design change, the noise fence barrier will be 2m higher, and consequently will be visible at three locations where the HS₂ route is either in a cutting less than 5m deep, at ground level or on embankment. These locations are: east of Manthorn Farm, south-west of Rosehill Farm and west of Barton Hartshorn Railway Wood. For the rest of this section of the HS₂ route, the 5m high noise fence barrier will be screened from view by cuttings up to 10.5m deep, by landscape earthwork bunds or by mitigation planting and existing woodland.
- 18.3.29 The top of the 5m noise fence barrier will be visible from Viewpoint 163.3.001: view north-east from PRoW (Footpath CHW/18) south of Manthorn Farm. Under the SES₃ scheme, the 3m high noise fence barrier at this location was largely screened from view by the cutting. As a result of the SES₄ design change, the 5m high noise fence barrier will be visible above the cutting, and consequently will be a new feature in the view. However, this will be seen as one of a series of components in the wider view,

including the Chetwode cutting and the Footpath CHW/18 accommodation overbridge. Therefore, the additional noise mitigation at Chetwode will not give rise to a new or different significant effect in years 1, 15 and 60, and will not change the level of significance of the effects reported in the main ES for Viewpoint 163.3.001: view north-east from PRoW (Footpath CHW/18) south of Manthorn Farm.

- 18.3.30 The additional noise mitigation at Chetwode will not be visible from Viewpoint 164.2.001: view south-west from 'The Green', Chetwode because although the cutting is less than 5m deep at this location, the noise fence barrier will be screened by a landscape earthworks bund. Consequently, the SES₄ design change will not give rise to a new or different significant effect in years 1, 15 and 60, and will not change the level of significance of the effects reported in the main ES for Viewpoint 164.2.001: View south-west from 'The Green', Chetwode.
- 18.3.31 The SES₄ design change will be largely screened from Viewpoint 165.4.001: view north-east from School End, west of Chetwode, as the cutting will be more than 5m deep at this location. The noise fence barrier will be briefly visible to motorists and pedestrians crossing the School End overbridge, but seen as one of a series of components in the wider view, including the Chetwode cutting. Consequently, the additional noise mitigation will not give rise to a new or different significant effect in years 1, 15 and 60 and will not change the level of significance of the effects reported in the main ES for Viewpoint 165.4.001: view north-east from School End, west of Chetwode.
- 18.3.32 The noise fence barrier will be visible in a narrow, filtered view from Viewpoint 166.2.001: view south-west from School End, Chetwode. It will be a new feature in the view as a noise fence barrier was not proposed in this location as part of the SES₃ scheme. However, it will be viewed as one of a series of components of the view including the School End overbridge. Consequently, the SES₄ design change will not give rise to a new or different significant effect in years 1, 15 and 60 and will not change the level of significance of the effects reported in the main ES on Viewpoint 166-2-001: view south-west from School End, Chetwode.
- 18.3.33 The additional noise mitigation will be screened from Viewpoint 164.4.001: view south from PRoW south-east of Chetwode, Viewpoint 165.2.001: View north-east from Barton Hill Farm and Viewpoint 166.2.003: view west from School End, Chetwode by landscape earthworks and the cutting embankments. The SES₄ design change will therefore not give rise to a new or different significant effect in years 1, 15 or 60, and will not change the level of significance of the effects reported in the main ES for these viewpoints.

Other mitigation measures

- 18.3.34 The permanent effects of the SES₄ scheme on landscape and visual receptors have been substantially reduced through incorporation of the measures described in the main ES (refer to Volume 2, CFA13, Section 9.5). Effects in year 1 of operation may be further reduced by establishing planting early in the construction programme, which will be considered during the detailed design stage. This would provide additional screening and greater integration of the SES₄ scheme into the landscape. However, no other mitigation measures are considered practicable due to the high visibility of elements of the SES₄ scheme and the sensitivity of the surrounding receptors.

Cumulative effects

- 18.3.35 There are no new or different likely significant cumulative permanent effects for landscape and visual assessment as a result of the SES₄ change interacting with the AP₁, AP₂ or AP₄ amendments or any relevant committed development.

Summary of likely residual significant effects

- 18.3.36 The provision of additional noise mitigation at Chetwode will not give rise to any new or different significant landscape and visual effects from operation or change the level of significance of the effects reported in the main ES.

18.4 Sound, noise and vibration

Introduction

- 18.4.1 This section of the report describes the environmental baseline in relation to sound, noise and vibration that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the changes introduced in Section 2, compared to those of the SES₃ scheme.

Scope, assumptions and limitations

- 18.4.2 The assessment scope, key assumptions and limitations for the sound, noise and vibration assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.
- 18.4.3 Local assumptions and limitations for sound, noise and vibration are set out in the main ES (Volume 2, CFA₁₃ Report: Section 11.3).

Environmental baseline

Existing baseline

- 18.4.4 The existing baseline sound and vibration information for this area is described in the main ES (Volume 2, CFA₁₃ Report: Section 11.2). Baseline sound levels representative of the assessment locations affected by the SES₄ change have been used in the construction and operational assessments.

Future baseline

Construction (2017)

- 18.4.5 The future baseline for construction in 2017, and construction traffic in 2021, remain unchanged from that reported in the main ES (Volume 2, CFA₁₃ Report: Section 11.2), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Operation (2026)

- 18.4.6 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₁₃ Report: Section 11.2), SES and AP₂ ES (Volume 5: Appendix CT-004-000), and the SES₃ and AP₄ ES (Volume 5: Appendix CT-004-000).

Effects arising during construction

- 18.4.7 There are no new or different significant effects from construction for sound, noise and vibration as a result of the SES₄ changes, in comparison with the main ES.

Effects arising from operation

Avoidance and mitigation measures

- 18.4.8 The noise fence barriers described in Section 17 alter the noise mitigation reported in the main ES.

Assessment of impacts and effects

- 18.4.9 Taking account of the avoidance and mitigation measures incorporated into the SES₃ scheme, forecast sound levels at Rosehill Barns, Rosehill Farm, The Hermitage and the residential property in committed development ref. CFA_{13/4} (refer to main ES Volume 2, Section 2) were assessed as above the daytime trigger threshold included in the Noise Insulation (Railways and Other Guided Systems) Regulations 1996²⁸. As a result, it was estimated that these buildings were likely to qualify for noise insulation. The mitigation measures, including noise insulation, will reduce noise inside all dwellings such that it will not reach a level where it would significantly affect residents.
- 18.4.10 The main ES identified a likely significant adverse noise effect on a community basis at approximately 25 dwellings and associated shared community open areas in the vicinity of the road that runs through Chetwode, identified as OSV_{13-Co3}²⁹ on maps SV-01-030 and SV-02-030 of the main ES, Volume 5, Sound, Noise and Vibration Map Book.
- 18.4.11 An assessment has been undertaken to determine whether operational noise levels from the design change would result in a new or different likely significant effect, using the significance criteria detailed in the main ES (Volume 5: Appendix SV-001-000).
- 18.4.12 The predicted operational sound and vibration levels as a result of this SES₄ design change are presented in the SES₄ and AP₅ ES, Volume 5: Appendix SV-004-013, with sound contours and residual significant effects shown on map series SV-01 and SV-02 in the SES₄ and AP₅ ES, Volume 5 Map Book.
- 18.4.13 The design change will reduce the operational airborne noise levels at The Hermitage residential property to an extent that this property is no longer expected to require noise insulation.
- 18.4.14 The design change reduces the forecast operational airborne sound levels at properties to the east of the route in Chetwode. The number of impacted residential dwellings (within the significant adverse noise effect reference OSV_{13-Co3}) is predicted to reduce as a result of the change from approximately 25 dwellings in the SES₃ scheme, to approximately 15 dwellings as a result of the SES₄ scheme.

²⁸ Her Majesty's Stationery Office (1996), The Noise Insulation (Railways and Other Guided Transport Systems) Regulations, London.

²⁹ Operational noise effects that are significant when assessed on a community basis are identified with a unique identification number, OSVXX-CXX. Further detail on these effects can be found in Volume 5, Appendix SV004-013 of the main ES.

- 18.4.15 Approximately 15 dwellings in Chetwode will experience adverse effects, which remain significant when assessed on a community basis. This significant effect, identified as OSV₁₃-Co₃, is considered different to that reported in main ES.
- 18.4.16 The design change does not alter the predicted operational ground-borne noise or vibration levels presented in the main ES and SES and AP₂ ES.

Other mitigation measures

- 18.4.17 No other mitigation measures are proposed.

Cumulative effects

- 18.4.18 There are no new or different likely significant cumulative effects for sound, noise and vibration as a result of the SES₄ change interacting with the AP₄ amendments, or any relevant committed development interacting with the SES₄ scheme.

Summary of likely residual significant effects

- 18.4.19 The design change will reduce the operational airborne noise levels at The Hermitage residential property to an extent that this property is no longer expected to require noise insulation. The design change will also give rise to a different operational residual significant effect compared to that reported in the main ES, specifically that the number of impacted properties included within significant effect number OSV₁₃-Co₃, on the community of Chetwode, reduces from approximately 25 to approximately 15 as a result of the change (refer to Volume 5: Appendix SV-004-013 of the SES₄ and AP₅ ES).

CFA13 Part 2: Additional Provision 5 Environmental Statement

19 Summary of amendments in CFA13

- 19.1.1 There are no amendments proposed within the Calvert, Steeple Claydon, Twyford and Chetwode area (CFA13).

CFA₁₅ Part 1: Supplementary Environmental Statement 4

20 Summary of changes in CFA₁₅

20.1 Changes to the design not requiring a change to the Bill

20.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES₃.

CFA₁₅ Part 2: Additional Provision 5 Environmental Statement

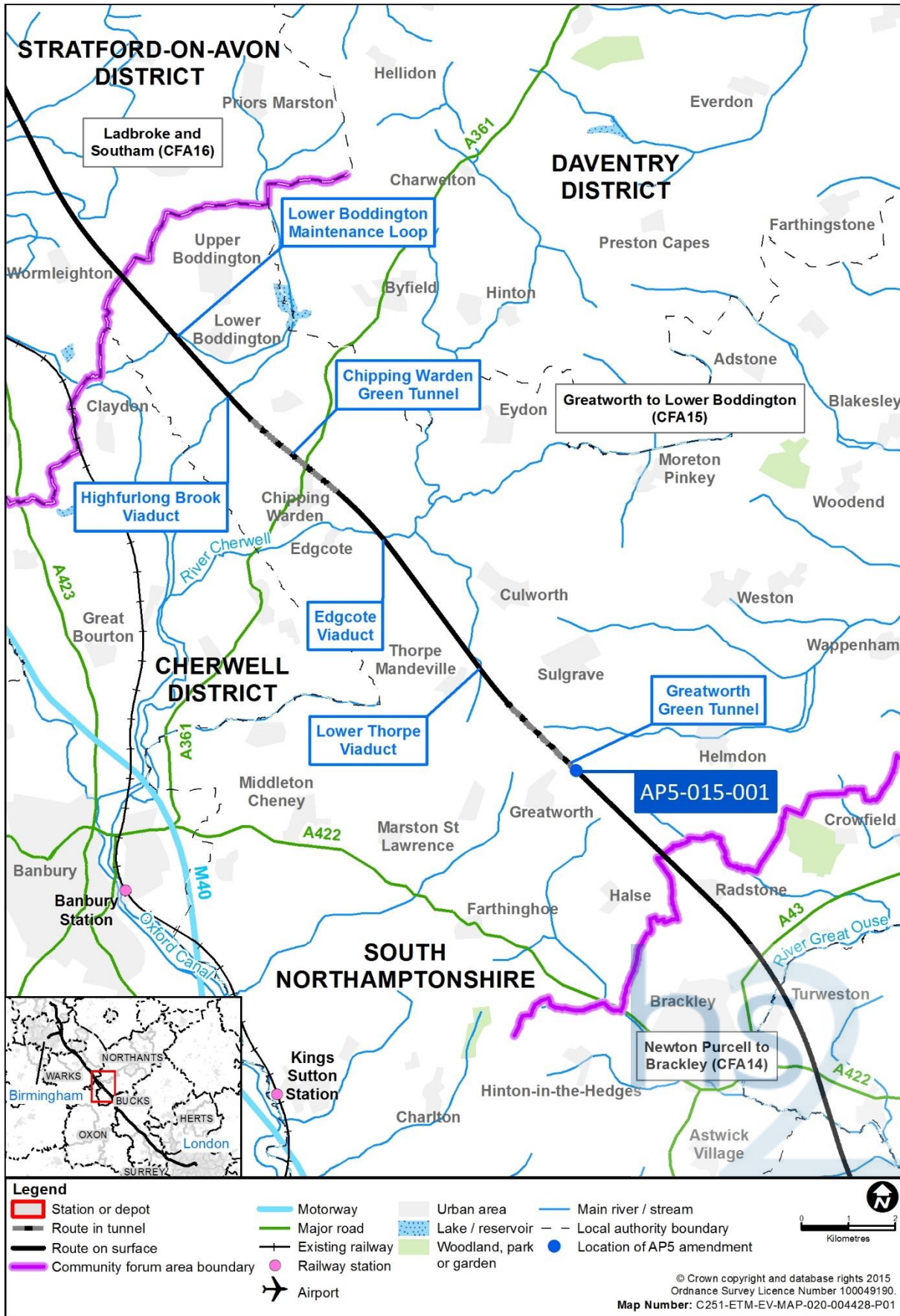
21 Summary of amendments in CFA₁₅

21.1.1 Table 10 provides a summary of the amendment in the Greatworth to Lower Boddington area (CFA₁₅), and Figure 7 shows the location of the amendment.

Table 10: Summary of amendment in CFA₁₅

Name of amendment	Description of the SES ₄ scheme	Description of the AP ₅ revised scheme
Provision to alter footpath AN ₁₃ diversion near Greatworth (AP ₅ -015-001)	The SES ₄ scheme includes the permanent stopping up of a section of Footpath AN ₁₃ approximately 400m to the north-west of Greatworth Hall. A temporary diversion will be provided during construction, followed by a permanent diversion from the access road for the Greatworth auto-transformer station then following the inside of the field boundary, to the point where Footpath AN ₁₃ joins Helmdon Road. The SES ₄ scheme also includes an extension of Footpath AN ₁₃ by 150m, still on the inside of the field boundary, alongside Helmdon Road, to the B ₄₅₂₅ Welsh Road.	The extension of Footpath AN ₁₃ from the point the footpath currently joins Helmdon Road to the B ₄₅₂₅ Welsh Road will not be implemented. The permanent diversion will rejoin Helmdon Road at the point where Footpath AN ₁₃ currently joins the road. The temporary diversion of the footpath is unchanged.

Figure 7: Location of amendment in CFA15



22 Assessment of amendments in CFA₁₅

22.1 Provision to alter footpath AN₁₃ diversion near Greatworth (AP₅-015-001)

- 22.1.1 The SES₄ scheme includes the permanent stopping up of a section of Footpath AN₁₃ approximately 400m to the north-west of Greatworth Hall. The section to be stopped up is situated between the access road for the Greatworth auto-transformer station and the junction of Footpath AN₁₃ with Helmdon Road, and is approximately 220m in length. A temporary alternative route for the footpath will be provided during construction for approximately six to nine months (refer to map CT-05-070 in the main ES, Volume 2, CFA₁₅ Map Book). The permanent diversion would use a section of the access track for the Greatworth auto-transformer station and then run parallel to Helmdon Road and remain on the inside of the field boundary to the point where Footpath AN₁₃ currently joins the road, increasing the length of the footpath by 200m. The SES₄ scheme would also provide a 150m extension parallel to Helmdon Road, so the footpath would terminate at the junction of Helmdon Road and the B₄₅₂₅ Welsh Road (refer to map CT-06-070 in the SES and AP₂ ES, Volume 2, CFA₁₅ Map Book).
- 22.1.2 As a result of further design, the extension will not be implemented. The permanent diversion route will remain unchanged, and will rejoin Helmdon Road at the point where Footpath AN₁₃ currently joins the road (refer to maps CT-05-070 and CT-06-070 in the SES₄ and AP₅ ES, Volume 2 Map Book). The temporary diversion of Footpath AN₁₃ is unchanged by this amendment.
- 22.1.3 The alteration of Footpath AN₁₃ is not considered to make changes that require reassessment of environmental effects or changes to proposed mitigation, as set out in the main ES, and subsequent SESs with respect to any environmental topic.

CFA20 Part 1: Supplementary Environmental Statement 4

23 Summary of changes in CFA20

23.1 Changes to the design not requiring a change to the Bill

- 23.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA, which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES₃.

CFA20 Part 2: Additional Provision 5 Environmental Statement

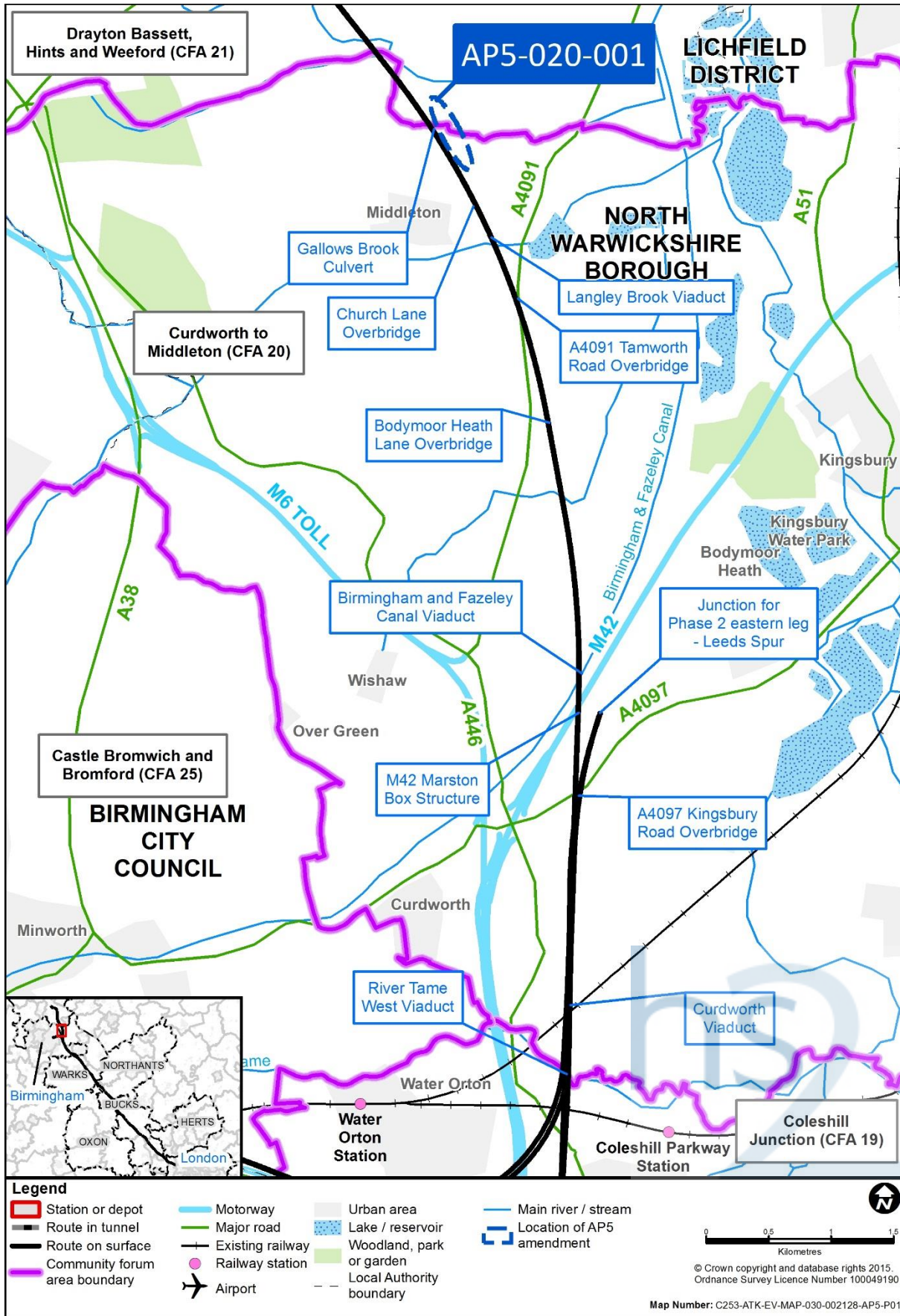
24 Summary of amendments in CFA20

24.1.1 Table 11 provides a summary of the amendment in the Curdworth to Middleton area (CFA20) and Figure 8 shows the location.

Table 11: Summary of amendment in CFA20

Name of amendment	Description of the SES4 scheme	Description of the AP5 revised scheme
<p>Additional land required for utility works near Middleton</p> <p>(AP5-020-001)</p> <p>This amendment extends into the Drayton Bassett, Hints and Weeford area (CFA21), however all effects for CFA20 and CFA21 are reported within this CFA</p>	<p>A 600mm diameter high-pressure gas main was diverted to cross the HS2 route perpendicular to the railway at a point approximately 100m south of Footpath T15 accommodation overbridge. The diversion then continued on the east side of the HS2 route and rejoined the existing gas main alignment approximately 300m north of Footpath T15 accommodation overbridge, just south of Gallows Brook. Areas of land for the excavation of working areas were included at the connections between the new and existing gas main at each end of the diversion.</p>	<p>An amendment is required to reduce construction difficulties associated with the excavation of the working areas to connect the diverted high-pressure gas main into the existing gas main just south of Gallows Brook. The amendment moves this excavation further north away from the brook.</p> <p>The amendment increases the length of the gas main diversion. The start of the diversion is unchanged from the SES4 scheme but the end of the diversion is approximately 200m north of that in the SES4 scheme. The revised diversion runs further east of the route outside of the land required for earthworks. The revised diversion will pass beneath Gallows Brook into CFA21.</p> <p>Larger areas of land are required for the excavated working areas at the connections between the new and existing gas mains.</p> <p>Additional land is required temporarily, and subsequently permanent access rights will be required for maintenance of the diverted gas main.</p>

Figure 8: Location of amendment in CFA20



25 Assessment of amendments in CFA₂₀

25.1 Additional land required for utility works near Middleton (AP₅-020-001)

- 25.1.1 The Bill provides for the diversion of a 600mm diameter high-pressure gas main located to the north of Church Lane, Middleton (refer to maps CT-06-115 and 116a in the main ES, Volume 2, CFA₂₀ Map Book). The gas main was diverted to cross the HS₂ route at a point approximately 100m south of Footpath T15 accommodation overbridge. The diversion then continued on the east side of the HS₂ route and rejoined the existing gas main alignment approximately 300m north of Footpath T15 accommodation overbridge, just south of Gallows Brook, which forms the boundary between CFA₂₀ and the Drayton Basset, Hints and Weeford area (CFA₂₁).
- 25.1.2 Since publication of the Bill, a number of amendments have been brought forward in this area, namely the Middleton area amendments (AP₂-020-007) and the Drayton Basset to Hints area amendments (AP₂-021-001). These amendments revised the vertical alignment of the HS₂ route in this area but did not alter the gas main diversion. AP₂-020-007 removed some land that was required under the original scheme. 1.1ha of that land will be required for this AP₅ amendment.
- 25.1.3 Since publication of the SES and AP₂ ES, a further review of the construction methodology for gas main diversions has been undertaken in conjunction with the utility company. This has taken into account the impact of HS₂ earthworks on the diverted gas main, and the difficulty of creating the connection between the new and existing gas pipe close to Gallows Brook.
- 25.1.4 As a result, a revised diversion route has been identified which increases the length of the gas main diversion and moves the connection further away from Gallows Brook. The location of the start of the diversion is unchanged from the SES₄ scheme, but the end of the diversion is moved approximately 200m north, into CFA₂₁. Trenchless techniques³⁰ will be used to construct the gas main beneath Gallows Brook. There will be no physical works to the brook itself, or its banks and associated hedgerows, as a result of this AP₅ amendment.
- 25.1.5 By moving the connection point north, further from Gallows Brook, the construction difficulties associated with the excavation of the working area to connect the diverted main into the existing main in close proximity to the watercourse are reduced.
- 25.1.6 The route of the diversion has also been moved approximately 100m to the east so that the diversion is not affected by the HS₂ earthworks.
- 25.1.7 Larger excavation areas are required at the connection of the new and the existing gas mains to accommodate the works.
- 25.1.8 In comparison to the SES₄ scheme, approximately 6.8ha of additional land is required temporarily in order to construct the revised diversion (refer to maps CT-05-115 and

³⁰ Typically pipelines are installed in open trenches. Where the pipeline crosses a road, river or railway this is not usually practicable and instead, trenchless techniques are used. These typically require the pipe to be pushed through the ground beneath the obstacle from excavated areas in a main launch site, to what is normally a smaller reception site on the other side of the obstacle.

116a in the SES₄ and AP₅ ES, Volume 2 Map Book). Permanent access rights will also be required to the gas main for future maintenance (refer to maps CT-06-115 and 116a in the SES₄ and AP₅ ES, Volume 2 Map Book).

- 25.1.9 This amendment extends into the Drayton Bassett, Hints and Weeford area (CFA₂₁). However, all effects for CFA₂₀ and CFA₂₁ are reported within this CFA report.
- 25.1.10 The additional land required for the gas main diversion is not considered to make changes that require a reassessment of the effects or proposed mitigation as set out in the main ES with respect to: air quality; community; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration and traffic and transport. However, there are changes where reassessment is considered to be required in respect of agriculture, forestry and soils, cultural heritage, ecology and water resources and flood risk assessment.

Agriculture, forestry and soils

Introduction

- 25.1.11 This section of the report describes the environmental baseline in relation to agriculture, forestry and soils that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme taking into account the amendments from previous AP ES reports that are relevant to the assessment.

Scope, assumptions and limitations

- 25.1.12 The assessment scope, key assumptions and limitations for agriculture, forestry and soils are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.
- 25.1.13 The area of agricultural land affected by the amendment is relatively small (approximately 6.8ha) and therefore will not alter the significance of effect, or result in a different effect, on best and most versatile (BMV) agricultural land or forestry land within the CFA₂₀ or CFA₂₁ areas.

Existing baseline

- 25.1.14 This amendment will directly affect two holdings in the Curdworth to Middleton area (CFA₂₀), and one holding within the Drayton Bassett, Hints and Weeford area (CFA₂₁) as follows: Bullock End Farm (land holding reference CFA_{20/13}), Church Farm (CFA_{20/14}) and Brook Farm (CFA_{21/1}). The three holdings extend over 308ha, 81ha and 115ha, respectively.
- 25.1.15 All three holdings are given over to general cropping of cereals and potatoes. They are all of high sensitivity to change because they grow crops that require irrigation.

Future baseline

Construction (2017)

- 25.1.16 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.

- 25.1.17 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on agriculture, forestry and soils.
- 25.1.18 Most existing environmental stewardship agreements expired in 2015 and can be replaced by a new environmental land management scheme (countryside stewardship) which, together with the new greening measures introduced by Common Agricultural Policy reform, will affect the detailed management of individual farm holdings, but are not expected to change fundamentally the baseline circumstances described.

Operation (2026)

- 25.1.19 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.20 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on agriculture, forestry and soils.

Effects arising during construction

- 25.1.21 The main ES reported a major/moderate adverse (significant) temporary effects on Bullock End Farm due to the effects of construction severance and disruptive effects on a carp fishery (a diversified farm enterprise), both of which are of medium magnitude. The amendment will increase the amount of land required temporarily from Bullock End Farm by 1.4ha. In comparison with the SES₄ scheme, the amount of land required temporarily from this holding will increase from 17.5ha (6% of the holding) to 18.9ha (6%). This slight increase in land required temporarily will not result in a new or different significant effect, and will not change the level of significance of the temporary effect reported in the main ES. The amendment does not require any land permanently from this holding, and the level of the significance of the permanent effect is unchanged from that reported in the main ES.
- 25.1.22 The main ES reported a major/moderate adverse (significant) temporary effects on Church Farm due to the impacts of the area of land required and construction severance, both of which are of medium magnitude. The amendment will increase the amount of land required temporarily from Church Farm by 1.6ha. In comparison with the SES₄ scheme, the amount of land required temporarily from this holding will increase from 8.9ha (11% of the holding) to 10.5ha (13%). This slight increase in land required temporarily will not result in a new or different significant effect and will not change the level of the significance of the temporary effect reported in the main ES. The amendment does not require any land permanently from this holding, and the level of the significance of the permanent effect is unchanged from that reported in the main ES.
- 25.1.23 The main ES (CFA21) reported a moderate adverse (significant) temporary effect on Brook Farm. The amendment will increase the amount of land required temporarily from Brook Farm by 3.8ha. In comparison with the SES₄ scheme, the amount of land required temporarily will increase from 10.5ha (9% of the holding) to 14.3ha (12%). As a result, the level of significance of the temporary effect increases from that reported in the main ES, from moderate adverse (significant) to major/moderate adverse (significant). This is a different significant effect to that reported in the main ES and is

illustrated on maps AG-01-058 and AG-01-059 in the SES₄ and AP₅ ES, Volume 5 Map Book.

- 25.1.24 The amendment does not require any land permanently from this holding, and the level of significance of the permanent effect is unchanged from that reported in the main ES, i.e. a moderate adverse (significant) effect associated with the amount of land required permanently (low magnitude).

Effects arising from operation

- 25.1.25 The amendment will not give rise to a new or different significant operational effect and will not change the level of significance of the effects reported in the main ES.

Mitigation and residual effects

- 25.1.26 No additional mitigation measures in addition to those identified in the main ES are required.
- 25.1.27 The amendment will give rise to a different significant effect on Brook Farm, increasing the likely residual significant temporary effect reported in the main ES from moderate adverse to major/moderate adverse.

Cumulative effects

- 25.1.28 All three holdings that are affected by the AP₅ amendment are also affected by the AP₂ amendments in this area (AP₂-020-007 and AP₂-021-001), which reduced the temporary land required. An assessment has been undertaken to identify any new or different significant effects resulting from the combined AP₂ and AP₅ amendments, compared to the SES₄ scheme. As the AP₅ amendment only results in a change to the temporary land required for the scheme, there are no likely significant cumulative permanent significant effects to report.
- 25.1.29 At Bullock End Farm, the additional amount of land required temporarily for the AP₅ amendment is 1.4ha. If the relevant AP₂ amendments are enacted, this would reduce the additional amount of land required temporarily from this holding by 0.5ha to 0.9ha. The amount of land required temporarily from this holding would be 18.4ha (6% of the holding). This change in the amount of land required temporarily would not result in a new or different likely significant cumulative effect and would not change the level of the significance of the temporary effect reported in the main ES (major/moderate).
- 25.1.30 At Church Farm, the additional amount of land required temporarily for the AP₅ amendment is 1.6ha. If the relevant AP₂ amendments are enacted this would reduce the additional amount of land required temporarily from this holding by 1ha to 0.6ha. The amount of land required temporarily from this holding would be 9.5ha (12% of the holding). This change in the amount of land required temporarily would not result in a new or different likely significant cumulative effect and would not change the level of the significance of the temporary effect reported in the main ES (major/moderate).
- 25.1.31 At Brook Farm, the additional amount of land required temporarily for the AP₅ amendment is 3.8ha. If the relevant AP₂ amendments are enacted this would reduce the additional amount of land required temporarily from this holding by 1.6ha to 2.2ha. The amount of land required temporarily from this holding would be 12.7ha

(11% of the holding) which would result in a major/moderate adverse significant effect. This is an increase in the level of the significance of the effect reported in the main ES (moderate adverse) but is the same effect as that reported for the AP₅ amendment in isolation.

- 25.1.32 There are no other likely significant cumulative effects on agriculture, forestry and soils as a result of the AP₅ amendments interacting with one another, the AP₁ amendments, AP₂ amendments, AP₄ amendments or any relevant committed development.

Cultural heritage

Introduction

- 25.1.33 This section of the report describes the environmental baseline in relation to cultural heritage that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme taking into account the amendments from previous AP ES reports that are relevant to the assessment.

Scope, assumptions and limitations

- 25.1.34 The assessment scope, key assumptions and limitations for cultural heritage are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000) and the SMR Addendum (Volume 5: Appendix CT-001-000) of the main ES.

Existing baseline

- 25.1.35 The cultural heritage baseline for the assessment takes into account information collected in support of the main ES, which includes walk-over survey, geophysical survey, remote-sensing data, and data from national and local registers. A full list is provided in Volume 2, Section 6.3 of the main ES. In addition, the baseline was updated with the results of additional survey work reported in the SES and AP₂ ES. Details of survey and desk-based work undertaken in this CFA since September 2013 are provided in the SES and AP₂ ES, Volume 5: Appendix CH-004-020 and Volume 5 Map Series CH-07; CH-09 and CH-10, where this is relevant to the assessment of a new or different significant effect.
- 25.1.36 Two heritage assets were identified in the main ES which could potentially be affected by the amendment through physical change. The first is a former watercourse (asset reference CWM109)³¹ and is of low value. The second is a historic hedgerow at a parish boundary (asset reference DHW148) which follows the line of Gallows Brook and is discussed in the main ES, Volume 2 for the Drayton Bassett, Hints and Weeford area (CFA21). It is of moderate value.
- 25.1.37 An additional heritage asset was identified in Part 1 of the SES and AP₂ ES as a result of additional surveys. This is also potentially affected by the amendment through physical change. The asset is possible pits and ditches north of Middleton (asset reference CWM152) and is of low value.

³¹ Cultural heritage assets are identified with a unique reference code, CWMXXX; further detail on these assets can be found in the gazetteer in Volume 5 of the main ES: Appendix CH-002-020.

*Future baseline***Construction (2017)**

- 25.1.38 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.39 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on cultural heritage.

Operation (2026)

- 25.1.40 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.41 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on cultural heritage.

Effects arising during construction

- 25.1.42 The main ES reported a permanent medium adverse impact on the former watercourse (asset reference CWM109) as a result of its partial removal, which would result in a permanent minor adverse effect, which is not significant.
- 25.1.43 The amendment will remove a small additional part of this asset (estimated to be between 5–10% additional removal). As only a small additional part of the asset will be removed, this will remain a medium adverse impact on this asset, resulting in a permanent minor adverse effect. The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES.
- 25.1.44 The main ES reported a medium adverse impact on the historic hedgerow (asset reference DHW148) as a result of the removal of most of the asset along its length, resulting in a moderate adverse effect, which is significant.
- 25.1.45 The amendment will not physically affect the historic hedgerow as trenchless techniques will be used to construct the gas main beneath Gallows Brook, which is where the hedgerow is located. There will be no physical works to the brook itself, or its banks and associated hedgerows, as a result of this amendment. The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reports in the main ES.
- 25.1.46 The SES and AP₂ ES (Part 1) reported a permanent high adverse impact on possible pits and ditches north of Middleton (asset reference CWM152) as it was partly within the land required for the construction of the scheme. This would result in a moderate adverse effect, which is significant.
- 25.1.47 The amendment will remove a small additional part of this asset. As the majority of the asset is already being removed by the SES₄ scheme, the removal of a small additional area will not change the level of impact and therefore there will remain a high adverse impact on this asset, resulting in a permanent moderate adverse effect. The amendment will not give rise to a new or different significant effect and will not

change the level of significance of the effects reported in Part 1 of the SES and AP₂ ES.

Effects arising from operation

- 25.1.48 The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES or subsequent SESs.

Mitigation and residual effects

- 25.1.49 No additional mitigation measures (i.e. in addition to those identified in the main ES and subsequent SES reports) are required.
- 25.1.50 The amendment will not give rise to a new or different likely significant residual effect and will not change the level of significance of the effects on cultural heritage reported in the main ES or subsequent SESs.

Cumulative effects

- 25.1.51 There are no new or different likely significant cumulative effects for cultural heritage as a result of the AP₅ amendment interacting with the AP₁ amendments, AP₂ amendments, AP₄ amendments or any relevant committed development.

Ecology

Introduction

- 25.1.52 This section of the report describes the environmental baseline in relation to ecology that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme taking into account the amendments from the previous AP ES reports, that are relevant to the assessment.

Scope, assumptions and limitations

- 25.1.53 The key assumptions and limitations, and the methodology for determining significance of effects are as set out in Volume 1, the SMR and the SMR Addendum (Volume 5: Appendix CT-001-000/01 and CT-001-000/02 of the main ES), and in Addendum 4 to the SMR (SES₃ and AP₄ ES, Volume 5: Appendix CT-001-000/5).
- 25.1.54 To address any limitations in data, a precautionary baseline has been considered according to the guidance reported in the main ES, Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment. The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the AP₅ revised scheme.

Existing baseline

- 25.1.55 The ecological baseline of the land required for the amendment has been based on field data collated for the main ES, aerial photography and relevant existing information gathered from national organisations and from regional and local sources including: Warwickshire County Council (Warwickshire Biological Records Centre) and Warwickshire Wildlife Trust.

- 25.1.56 A summary of the baseline information relevant to the assessment of the amendment is provided below. For those receptors described in the main ES, further details are provided in Volume 2, CFA20, Section 7 and in Volume 5, including maps EC-01 to EC-12.

Designated sites

- 25.1.57 There are no statutory or non-statutory designated nature conservation sites or ancient woodland relevant to the assessment.

Habitats

- 25.1.58 The land required for the amendment consists predominantly of arable land covering a number of large arable fields. Arable land is considered to be of negligible ecological value.
- 25.1.59 The hedgerow network within the land required for construction of the original scheme was reported in the main ES as having district/borough value. Approximately 340m of species-poor hedgerow supporting trees is located within the land required for the amendment, the majority located adjacent to Gallows Brook. These hedgerows form part of the wider hedgerow network within the Curdworth to Middleton area.
- 25.1.60 Gallows Brook is located within land required for the amendment. The main ES reported that Gallows Brook has a significantly modified channel in the Middleton area and supports a limited diversity of plants. However, the watercourse is considered to provide a wildlife corridor and therefore is assessed in the main ES as being of local/parish value.

Protected and/or notable species

- 25.1.61 No water bodies are located within the land required for the amendment. However, nine water bodies are located within 250m.
- 25.1.62 A small population size class of great crested newt was recorded in one pond located 85m east of the land required for the amendment, to the south of Gallows Brook. Great crested newts from this pond are likely to predominantly use the hedgerows and field margins within the land required for the amendment as terrestrial habitat, and are less likely to use the arable land available as this represents suboptimal terrestrial habitat. The main ES reported the great crested newt population using this pond to be of up to county/metropolitan value.
- 25.1.63 A small population size class of great crested newt was recorded in one pond located 140m east of the land required for the amendment located north of Gallows Brook. Great crested newts from this pond will likely use the hedgerows and field margins within the land required for the amendment as terrestrial habitat, and are less likely to use the arable land available, as this represents suboptimal terrestrial habitat and other more suitable terrestrial habitat is available within the immediate area. This great crested newt population has up to county/metropolitan value.

- 25.1.64 The main ES (CFA21) identified assumed metapopulation³² AMP25 (south-west of Drayton Bassett) as having two water bodies, both of which have been surveyed. The land required for the amendment lies partially within AMP25 and approximately 30m to the west and 30m to the south of the two confirmed great crested newt breeding ponds. Great crested newts from these ponds are likely to utilise the hedgerows and field margins that are located within the land required for the amendment as terrestrial habitat. Both ponds within AMP25 were reported to contain a small population size class of great crested newt. However, due to incomplete survey, as a precaution it was assumed within the main ES that AMP25 could support a medium population size class of great crested newt and was valued at up to county/metropolitan level.
- 25.1.65 The main ES (CFA21) identified AMP26 (north of Middleton) as having five water bodies, all of which have had incomplete surveys due to land access restrictions. Four of the water bodies support great crested newt. The land required for the amendment lies partially within AMP26 and approximately 160m to the south-east of the nearest confirmed great crested newt breeding pond. Great crested newts from AMP26 are likely to utilise the hedgerows and field margins within land required for the amendment as terrestrial habitat. AMP26 was reported to contain a medium population size class of great crested newt and was valued at county/metropolitan level in the main ES.
- 25.1.66 The main ES reported an assemblage of bats using foraging and commuting habitats that lie east and west of the A4091 Tamworth Road, including Langley Brook west of Middleton Park, and Coneybury Wood located adjacent to the south of the land required for the amendment. This included common pipistrelle, soprano pipistrelle, *Myotis* species, noctule and Leisler's. This assemblage of bats was reported in the main ES as being of district/borough value. There are no buildings or trees supporting known bat roosts within the land required for the amendment. A review of aerial photography indicates that trees are present within the hedgerows and along the banks of Gallows Brook located within land required for the amendment, which could have potential to support roosting bats. Connective habitat, in the form of hedgerows, and watercourses link the hedgerows and trees located within the land required for the amendment to those habitats used by the bat assemblage. Taking a precautionary approach, the trees present within the land required for the amendment could support roosting bats that are part of the assemblage of bats using foraging and commuting habitats that lie east and west of the A4091 Tamworth Road. In addition, bats from this assemblage could potentially utilise the hedgerows and Gallows Brook within the area required for the amendment as a foraging area and commuting route.
- 25.1.67 The trees, hedgerows and arable fields within the land required for the amendment have the potential to support breeding and wintering birds. Considering the habitat present and the agricultural setting, it is likely that common and widespread bird species will be present in these areas and that these breeding or wintering bird populations would be of no more than local/parish value.

³² A great crested newt metapopulation is a group of associated populations made up of newts which both breed in the ponds and live in the terrestrial habitat around a cluster of ponds. The newts are likely to return to the same pond each year; however, there may be some interchange of newts between the ponds within the metapopulation. Assumed metapopulations have been identified based on a combination of desk-based information and survey results. Details of amphibian metapopulations are given in the main ES, Volume 5: Appendix EC-002-003.

- 25.1.68 The main ES reported an assemblage of aquatic invertebrates in Gallows Brook of local/parish value.

Future baseline

Construction (2017)

- 25.1.69 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.70 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on ecology.

Operation (2026)

- 25.1.71 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.72 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on ecology.

Effects arising during construction

Avoidance and mitigation measures

- 25.1.73 The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES), which includes translocation of protected species where appropriate. A trenchless boring technique will be used in the Gallows Brook area to avoid impacts on the watercourse and associated habitats including the hedgerows.

Designated sites

- 25.1.74 The amendment will not give rise to new or different significant effects on designated sites, and will not change the level of significance of the effects reported in the main ES.

Habitats

- 25.1.75 The main ES reported that the combined loss (22.5km) and severance of hedgerows within the Curdworth to Middleton area will cause an adverse effect on the conservation status of the hedgerow network, which will be significant at a district/borough level. The 260m length of hedgerow associated with Gallows Brook located within the land required for the amendment will not be affected by the gas main diversion route, as a trenchless boring technique will be used in this area. The amendment will however result in the loss of 80m of other hedgerow. The amendment will give rise to a different significant effect on the conservation status of hedgerows. However, this will not change the level of significance of the effects reported in the main ES.
- 25.1.76 The main ES reported the loss of approximately 50m of Gallows Brook and severance of the watercourse through culverting as a result of the original scheme. The loss was not considered significant as it represented a local/parish level effect. The gas main

diversion route will now be constructed beneath Gallows Brook using trenchless techniques, which will avoid any change to the impacts on the existing watercourse and its habitats. The amendment will not give rise to a new or different significant effect on the conservation status of Gallows Brook and will not change the level of significance of the effects reported in the main ES.

Protected and/or notable species

- 25.1.77 The main ES reported that the original scheme does not result in significant effects upon AMP25, the population of great crested newts using a water body south of the Gallows Brook, or the great crested newt population using a water body to the north of the Gallows Brook. The original scheme did not result in the loss of any water bodies used by these great crested newt populations, but did result in areas of terrestrial habitat loss. The amendment will result in additional terrestrial habitat loss for these populations, however the areas lost comprise arable land and represent suboptimal terrestrial habitat for great crested newts. The area of terrestrial habitat loss will not therefore lead to a new or different significant effect on the populations concerned. Implementation of measures within the draft CoCP will ensure that there will be no killing or injury of newts as a result of the amendment. Any mitigation required to avoid killing/injury will be undertaken in accordance with the principles of ecological mitigation identified within the SMR Addendum of the main ES (Volume 5: Appendix CT-001-000/2). This amendment does not result in a new or different significant effect on AMP25, the great crested newt population using the waterbody south of Gallows Brook or the great crested newt population using the waterbody to the north of Gallows Brook.
- 25.1.78 The original scheme resulted in the permanent loss of all five ponds and approximately two thirds of the available terrestrial habitat at AMP26. The main ES reported a permanent adverse effect on the conservation status of great crested newt within AMP26 that would be significant at the county/metropolitan level. The amendment will result in the loss of an additional 1.3ha of arable land, within the AMP26 boundary which is suboptimal habitat for great crested newt, but maybe utilised as terrestrial habitat. The works to implement the diversion of the gas main in this area could have temporary impacts on individual great crested newts within the population. Implementation of measures within the draft CoCP will ensure that there will be no killing or injury of newts as a result of the amendment. Any mitigation required to avoid killing/injury will be undertaken in accordance with the principles of ecological mitigation identified within the SMR Addendum of the main ES (Volume 5: Appendix CT-001-000/2). This amendment will not result in a new or different significant effect on the great crested newt population in AMP26, and will not change the level of significance of the effects reported in the main ES.
- 25.1.79 The main ES reported that the combined impacts of the loss of roosts and key foraging areas, along with the severance of commuting routes on the assemblage of bats using foraging and commuting habitats that lie east and west of the A4091 Tamworth Road, will result in an adverse effect on the conservation status of the assemblage of bats that will be significant at a district/borough level. Bats from this assemblage may utilise the hedgerows that are affected by the amendment for foraging and commuting. The amendment will not give rise to a new or different significant effect on the conservation status of the assemblage of bats using foraging

and commuting habitats that lie east and west of the A₄₀₉₁ Tamworth Road, as a result of minor additional disruption of the wider foraging and commuting resource. This amendment will not change the level of significance of the effects reported in the main ES.

- 25.1.80 The amendment will result in the temporary loss of approximately 6.8ha of arable land and 80m of hedgerow suitable to support breeding birds of local/parish value. The amendment will not result in a new or different significant effect on breeding birds or change the level of significance of the effects reported in the main ES.

Cumulative effects

- 25.1.81 There are no new or different likely significant cumulative effects for ecology as a result of the AP₅ amendment interacting with the AP₁ amendments, AP₂ amendments, AP₄ amendments or any relevant committed development.

Mitigation and residual effects

Other mitigation measures

- 25.1.82 No additional mitigation measures (i.e. in addition to those identified in the main ES) are required. The mitigation identified previously remains sufficient to address the different significant effects arising from the amendment.

Summary of likely residual effects

- 25.1.83 No new or different likely residual significant effects on ecological receptors occur as a consequence of the amendment. The significant residual effects of the AP₅ revised scheme in this area are therefore unchanged from those reported in the main ES.

Effects arising from operation

- 25.1.84 There are no new or different significant operational effects for ecology as a result of the amendment in comparison with those reported in the main ES.

Water resources and flood risk assessment

Introduction

- 25.1.85 This section of the report describes the environmental baseline in relation to water resources and flood risk that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment compared to those of the SES₄ scheme, taking into account the amendments from previous AP ES reports, that are relevant to the assessment.

Scope, assumptions and limitations

- 25.1.86 The assessment scope, key assumptions and limitations for water resources and flood risk assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 - 000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Existing baseline

- 25.1.87 Gallows Brook crosses the area of the proposed utilities works and flows eastwards. The Environment Agency has identified a 1% (1 in 100 annual probability of occurrence) flood risk from rivers associated with the brook. The updated flood maps

for surface water do not identify any areas at risk of surface water flooding apart from areas immediately adjacent to the watercourse (and within the riverine flood plain). There are no residential properties within the flood plain near the route. The land use within the floodplain is agriculture, which is categorised as less vulnerable in relation to flood risk (moderate value receptor). The brook itself has a value of moderate.

- 25.1.88 Bedrock in the area is the Mercia Mudstone Group, which is a Secondary B Aquifer. Alluvial deposits, which are Secondary A Aquifers are associated with the Gallows Brook in the area. Both aquifers are of moderate value. There are no SPZs within the study area.

Future baseline

Construction (2017)

- 25.1.89 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.90 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on water resources and flood risk.

Operation (2026)

- 25.1.91 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 25.1.92 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on water resources and flood risk.

Effects arising during construction

Temporary effects

- 25.1.93 The main ES reported no residual temporary significant effects on surface water, groundwater or flood risk during the construction period.
- 25.1.94 The amendment is likely to require construction works within the flood plain associated with the Gallows Brook, with trenchless techniques being used to construct the gas main under the brook. The excavations required for the launch and reception sites will be at sufficient distance from the brook to ensure no physical impact on the brook and its banks. Measures set out in the draft CoCP will be applied to manage the potential impact upon flood risk and to protect the Secondary Aquifers. There will be no significant effect on either surface water or groundwater resources.
- 25.1.95 The excavation required to connect the northern end of the diverted main into the existing main has been moved further from the brook; this is considered to be a beneficial change albeit there was no significant adverse impact identified as a result of the SES₄ scheme.
- 25.1.96 The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES.

Permanent effects

- 25.1.97 The main ES reported no residual permanent significant effects on surface water, groundwater or flood risk as a result of the construction of the scheme.
- 25.1.98 The trenchless techniques employed to construct the gas main under the brook have the potential to give rise to settlement, which could alter the connectivity between the shallow groundwater within the alluvial deposits (a Secondary A Aquifer) and the brook, for example, by causing fissuring. This could alter the balance of flows into/out of the brook. However, as the alluvial deposits are recent, unconsolidated sediments deposited by the brook itself, which are not liable to fissuring, it is not considered that this effect will be realised at this location. Therefore, it is concluded that the amendment will not give rise to a new or different significant effect and will not change the level of significance of effects reported in the main ES.

Effects arising from operation

- 25.1.99 The amendment will not give rise to a new or different significant operational effect and will not change the level of significance of the effects reported in the main ES.

Mitigation and residual effects

- 25.1.100 No additional mitigation measures in addition to those identified in the main ES are required.
- 25.1.101 The amendment will not give rise to a new or different likely significant residual effect and will not change the level of significance of the effects on water resources and flood risk reported in the main ES.

Cumulative effects

- 25.1.102 There are no new or different likely significant cumulative effects for water resources and flood risk as a result of the AP5 amendment interacting with the AP1 amendments, AP2 amendments, AP4 amendments or any relevant committed development.

Summary of new or different likely residual significant effects as a result of the amendment

- 25.1.103 The additional land required for utility works near Middleton will give rise to a different significant residual effect for agriculture, forestry and soils. The amendment will increase the residual significant temporary effect on Brook Farm (CFA21/1), reported in the main ES from a moderate adverse effect to a major/moderate adverse effect.
- 25.1.104 If the AP2 amendments in this area (AP2-020-007 and AP2-021-001) are enacted, there would be a reduction in the amount of additional land required temporarily from this holding. This would result in a major/moderate adverse effect which is an increase from that reported in the main ES, but the same effect as for the AP5 amendment in isolation.

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26 Summary of changes in CFA21

26.1 Changes to the design not requiring a change to the Bill

26.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA which will give rise to new or different significant environmental effects to those reported in the main ES or the SES.

CFA21 Part 2: Additional Provision 5 Environmental Statement

27 Summary of amendments in CFA21

27.1.1 Table 12 provides a summary of the amendments in the Drayton Bassett, Hints and Weeford area (CFA21), and Figure 9 shows the locations.

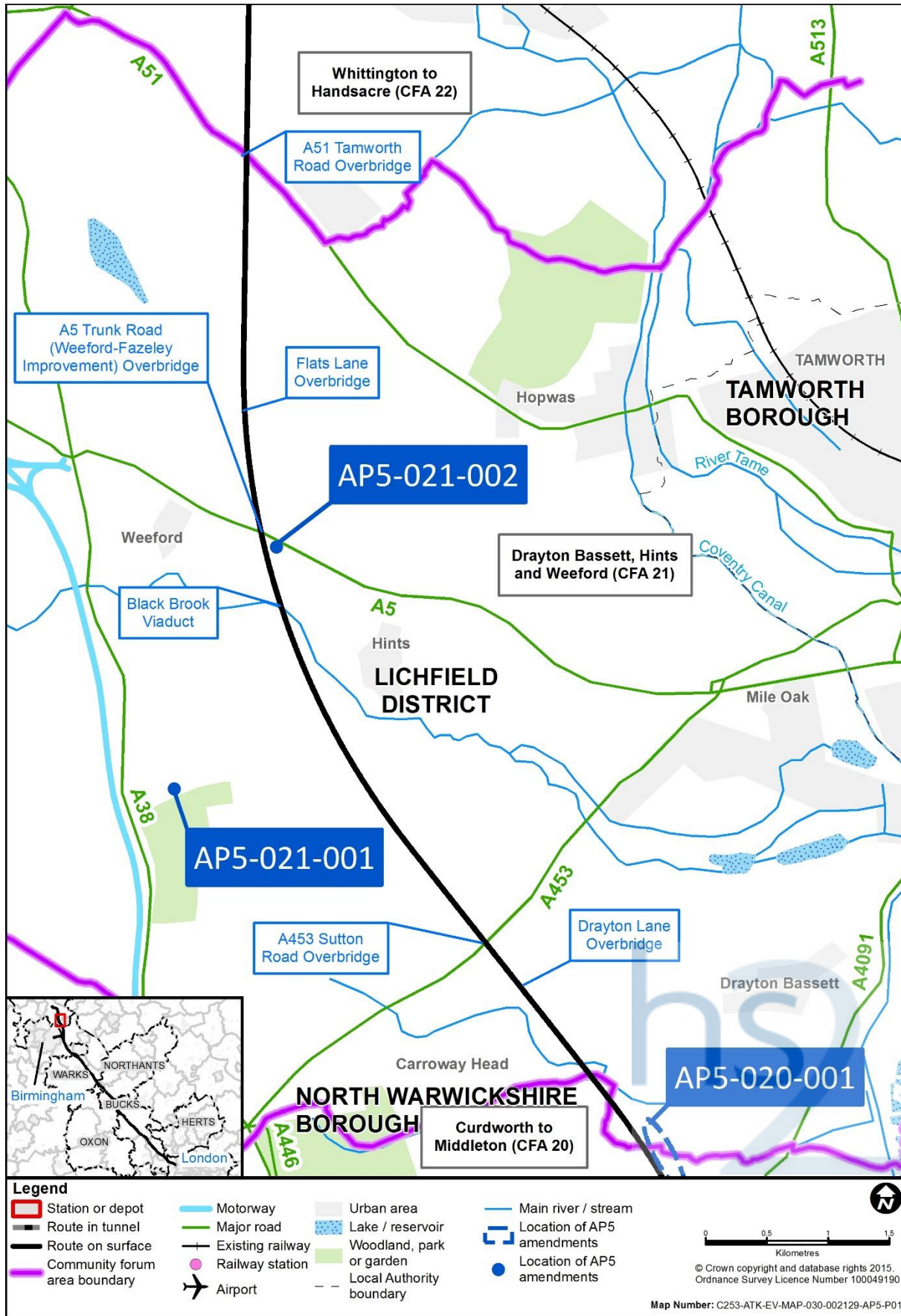
Table 12: Summary of amendments in CFA21

Name of amendment	Description of the SES4 scheme	Description of the AP5 revised scheme
<p>Additional land required for utility works near Middleton</p> <p>(AP5-020-001)</p> <p>This amendment is described and assessed in the CFA20 section of this SES4 and AP5 ES, Volume 2 report and shown on the maps CT-05-116b and CT-06-116b in the SES4 and AP5 ES, Volume 2 Map Book</p>	<p>A 600mm diameter high-pressure gas main was diverted to cross the HS2 route perpendicular to the railway at a point approximately 100m south of Footpath T15 accommodation overbridge. The diversion then continued on the east side of the HS2 route and rejoined the existing gas main alignment approximately 300m north of Footpath T15 accommodation overbridge, just south of Gallows Brook. Areas of land for the excavation of working areas were included at the connections between the new and existing gas main at each end of the diversion.</p>	<p>An amendment is required to reduce construction difficulties associated with the excavation of the working area to connect the diverted gas main into the existing gas main just south of Gallows Brook. The amendment moves this excavation further north away from the brook.</p> <p>The amendment increases the length of the gas main diversion. The start of the diversion is unchanged from the SES4 scheme but the end of the diversion is approximately 200m north of that in the SES4 scheme. The revised diversion runs further east of the route outside of the land required for earthworks. The revised diversion will pass beneath Gallows Brook.</p> <p>Larger areas of land are required for the excavated working areas at the connections between the new and existing gas main.</p> <p>Additional land is required temporarily, and subsequently permanent access rights will be required for maintenance of the diverted gas main.</p>

SES₄ and AP₅ ES Volume 2

Name of amendment	Description of the SES ₄ scheme	Description of the AP ₅ revised scheme
<p>Additional land required for utility winching works west of Brockhurst Lane</p> <p>(AP₅-021-001)</p>	<p>Temporary diversion of overhead power lines terminating at the sand and gravel quarry east of the M6 toll, including an area for winching.</p> <p>AP₁-021-043 amended the extent of land required to the west of Brockhurst Lane resulting in an additional 0.3ha of land required for winching and included temporary access rights from the realigned winching site to the existing access track from the A38 London Road.</p>	<p>In comparison to the SES₄ scheme, an additional 2.2ha of land is required temporarily, in addition to the 0.3ha that was required as a result of amendment AP₁-021-043. As the area of land is an active sand and gravel quarry, there is uncertainty about the ground conditions at the time the overhead line winching works will be undertaken. Further land is required to provide greater flexibility to address this during construction.</p> <p>As this AP₅ amendment is dependent on AP₁-021-043 for the winching area and temporary access this AP₅ amendment will only be implemented in the event that the AP₁ amendment is enacted.</p>
<p>Additional land required for the upgrading of the A₅ Hints Bridleway 4 overbridge to an accommodation overbridge</p> <p>(AP₅-021-002)</p>	<p>The SES₄ scheme provided for the raising of the A₅ adjacent to Buck's Head Farm, Hints. As a result, the existing accommodation overbridge, which carries the Heart of England Way (Hints Bridleway 4), would be demolished and replaced by a new bridleway only bridge – the A₅ Hints Bridleway 4 overbridge.</p>	<p>The amendment changes the A₅ Hints Bridleway 4 overbridge to an accommodation overbridge in the same location. The Heart of England Way (Hints Bridleway 4) will continue to be diverted over the bridge.</p> <p>Additional land will be required permanently to the north of the A₅ to widen the bridge and access routes.</p>

Figure 9: Locations of amendments in CFA21



28 Assessment of amendments in CFA₂₁

28.1 Additional land required for utility winching works west of Brockhurst Lane (AP₅-021-001)

- 28.1.1 The Bill provides for overhead power line diversions terminating at the sand and gravel quarry east of the M6 Toll, including an area for winching (refer to map CT-05-120-L1 in the main ES, Volume 2, CFA₂₁ Map Book).
- 28.1.2 The AP₁ ES reported that the area for winching power lines within the gravel pits needed to be in line with power lines to the east, not in the direction of power lines to the west. Amendment AP₁-021-043 therefore included a small additional area of land on the north side of the western extent of land already included in the Bill. A similar area from the southern side was no longer required (refer to map CT-05-120-L1 in the AP₁ ES Volume 2 Map Book Part 5 of 6). In addition, the AP₁ amendment included temporary access to the realigned winching site from the existing access track from the A38 London Road, utilised as part of AP₁-021-042, which will be unaffected by the AP₅ amendment.
- 28.1.3 Since the publication of the AP₁ ES, a further review of the area required for winching has been undertaken and, due to ongoing quarrying activities and uncertainty about the ground conditions at the time the winching works will be undertaken, a larger area is required to provide increased flexibility (refer to map CT-05-120-L1 in the SES₄ and AP₅ Volume 2 Map Book). This amendment (AP₅-021-001) will only proceed in the event that Parliament approves amendment AP₁-021-043, as both the winching area and the temporary access included with that amendment will still be required.
- 28.1.4 In comparison to the SES₄ scheme, 2.2ha of land is required temporarily for the AP₅ amendment, in addition to the 0.3ha that was required as a result of amendment AP₁-021-043. Therefore, a total of 2.5ha of additional temporary land is required for these utility works.
- 28.1.5 There are water bodies present within the quarry. However, these are temporary and transient features, and it is not possible to predict where these will be at the time the works take place due to the ongoing operation of the quarry. The full area within the amendment will not be required, and works will not be conducted within water bodies. However, given it is not possible to predict the future location of the water bodies, the area of the amendment proposed is precautionary to allow sufficient flexibility to ensure provision of a platform for winching without affecting water bodies and to take account of ground conditions in the quarry at the time of construction. Fencing will be erected around any water bodies present to avoid effects upon them. There are no changes to Weeford Bridleway 0.479 as a result of the amendment.
- 28.1.6 The additional land required for the winching area is not considered to make changes that require a reassessment of the effects or proposed mitigation as set out in the main ES with respect to: agriculture, forestry and soils; air quality; community; cultural heritage; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration; traffic and transport; and water resources and flood risk assessment. However, there are changes where reassessment is considered to be required in respect of ecology.

Ecology

Introduction

- 28.1.7 This section of the report describes the environmental baseline in relation to ecology that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES4 scheme. The assessment of AP5-021-001 takes account of the combined effects of the AP1 and AP5 amendments compared to those of the SES4 scheme.

Scope, assumptions and limitations

- 28.1.8 The key assumptions and limitations, and the methodology for determining significance of effects for ecology are as set out in Volume 1, the SMR and the SMR Addendum (Volume 5: Appendix CT-001-000/01 and CT-001-000/02 of the main ES) and in Addendum 4 to the SMR (SES3 and AP4 ES, Volume 5: Appendix CT-001-000/5).
- 28.1.9 To address any limitations in data, a precautionary baseline has been considered according to the guidance reported in the main ES, Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment. The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the AP5 revised scheme.

Existing baseline

- 28.1.10 The ecological baseline of the land required for the amendment has been based on field data collated for the main ES, the AP1 ES, aerial photography and relevant existing information gathered from national organisations and from regional and local sources including: Staffordshire Ecological Record and Staffordshire Wildlife Trust.
- 28.1.11 A summary of the baseline information relevant to the assessment of the amendment is provided below. For those receptors described in the main ES, further details are provided in Volume 2, CFA21, Section 7 and in Volume 5, including maps EC-01 to EC-12. For those receptors described in the AP1 ES, further details are provided in Volume 2, CFA21, Section 52.

Designated sites

- 28.1.12 There are no statutory or non-statutory designated nature conservation sites relevant to the assessment.

Habitats

- 28.1.13 Weeford Park ancient replanted woodland is located approximately 55m east of the amendment. As reported in the main ES, Weeford Park ancient replanted woodland is of county/metropolitan value. There are no other areas of ancient woodland relevant to the assessment.
- 28.1.14 The land to be affected by the amendment is within a sand and gravel quarry. The southern end of the quarry, close to the amendment area, has been viewed from a PRoW, due to access restrictions, and from aerial photography. This area appears to be dominated by bare ground (sand) with occasional areas of colonising vegetation and includes several water bodies within 250m of the land required for the

amendment. The land required for the amendment includes five water bodies. The habitats within the sand and gravel quarry, which includes the land required for the amendment, were reported in the AP₁ ES as being of local/parish value.

Protected and/or notable species

- 28.1.15 There are no records of protected or notable species within the land required for the amendment.
- 28.1.16 Five water bodies formed as transient features of the sand and gravel quarry are located within the land required for the amendment. A further six water bodies are located within 250m of the land required for the amendment. Surveys have not been undertaken of these 11 water bodies due to access limitations. The main ES reported that water bodies that have not been surveyed could support breeding populations of great crested newt of medium population size class. Taking the same precautionary approach, it is assumed water bodies within the quarry may support populations of great crested newts of medium population size class and would be of up to county/metropolitan value.
- 28.1.17 Given the habitat of large exposed areas of gravel workings and water bodies, there is the potential for the quarry to support notable breeding bird species such as little ringed plover (which are protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)). Taking a precautionary approach, a breeding population of little ringed plover in this location would be of up to country/metropolitan value.

Future baseline

Construction (2017)

- 28.1.18 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 28.1.19 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on ecology.

Operation (2026)

- 28.1.20 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 28.1.21 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on ecology.

Effects arising during construction

Avoidance and mitigation measures

- 28.1.22 The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES), which includes translocation of protected species where appropriate.

Designated sites

- 28.1.23 No impacts on statutory or non-statutory designated nature conservation sites are anticipated as a result of the amendment.

Habitats

- 28.1.24 The main ES and the AP1 ES reported that no impacts were expected on Weeford Park ancient replanted woodland.
- 28.1.25 The AP1 ES reported that the loss of 0.3ha of bare ground and colonising vegetation within the quarry area as a result of the AP1 amendment would not result in an adverse effect on the conservation status of habitats and was not significant. The AP1 and AP5 amendments will result in the loss of a total of 2.5ha of bare ground with negligible areas of colonising vegetation compared to the SES4 scheme. There will be no loss of water bodies within the sand and gravel quarry as a result of the amendments and consequently no additional effects on water bodies are anticipated compared to those reported in the main ES. The amendments will not generate any new or different significant effects, or change the level of significance of the effects reported in the main ES.

Protected and/or notable species

- 28.1.26 The main ES reported that, should great crested newt be present within water bodies within the land required for the scheme, the original scheme could result in adverse effects on the conservation status of the great crested newt populations concerned which would, in each case, be significant at up to a county/metropolitan level. The AP1 ES reported that the water bodies within the quarry would not be lost as a result of the AP1 revised scheme, although 0.3ha of suitable great crested newt terrestrial habitat would be. The AP5 amendment will not result in the loss of water bodies located within land required for the construction of the AP5 revised scheme, but will give rise to the potential loss of an additional 2.2ha of suboptimal great crested newt terrestrial habitat. There will be no loss of breeding aquatic habitat used by great crested newt. Assuming great crested newt are present within the water bodies, the implementation of measures within the draft CoCP will ensure that there will be no killing or injury of great crested newts (if present) as a result of the amendment. The amendment will result in a different significant effect on the conservation status of great crested newt, due to the loss of additional suboptimal terrestrial habitat. However, this will not change the level of the significance of effects on great crested newt which remains significant up to the county/metropolitan level, as reported in the main ES.
- 28.1.27 The main ES did not predict any impacts on little ringed plover within the quarry area. The AP1 ES reported that the winching work associated with the AP1 revised scheme could disturb breeding little ringed plover, if present, and cause them to abandon nests which would result in an effect significant at up to a county/metropolitan level. Potential disturbance caused during construction work for the AP5 revised scheme is not expected to be elevated above that predicted for the AP1 revised scheme. The amendment will not give rise to new or different significant effects on the conservation status of little ringed plover and will not change the level of significance of the effects reported in the AP1 ES.

Cumulative effects

- 28.1.28 There are no new or different likely significant cumulative effects for ecology as a result of the AP5 amendments interacting with one another, the AP1 amendments (excluding AP1-021-043 which forms part of this assessment), AP2 amendments, AP4 amendments or any relevant committed development.

*Mitigation and residual effects***Other mitigation measures**

- 28.1.29 Mitigation measures for great crested newt reported in the main ES consist of providing compensatory habitats within ecological compensation areas within the Drayton Bassett, Hints and Weeford area. This will include the provision of replacement ponds, terrestrial habitat and hibernation habitat sufficient to maintain the favourable conservation status of the amphibian populations affected. With the implementation of these mitigation measures, it is expected that the different effect on great crested newt due to the loss of potential breeding habitat within land required for the amendment will be reduced to a level which will not result in any significant effect on the conservation status of great crested newt.
- 28.1.30 Measures to avoid likely significant impacts on breeding birds, should they be present, will be carried out in accordance with the principles of ecological mitigation identified within the SMR Addendum of the main ES (Volume 5: Appendix CT-001-000/2). As reported in the AP1 ES, the implementation of these measures will reduce disturbance to a level which will not result in any significant effect on the conservation status of little ringed plover.
- 28.1.31 No additional mitigation measures (i.e. in addition to those identified in the main ES and AP1 ES) are required. The mitigation identified previously remains sufficient to address the new and different significant effect arising from the amendment.

Summary of likely residual effects

- 28.1.32 No new or different likely residual significant effects on ecological receptors will arise as a consequence of the amendment. The likely significant residual effects of the AP5 revised scheme in this area are therefore unchanged from those reported in the main ES and AP1 ES.

Effects arising from operation

- 28.1.33 There are no new or different likely residual significant operational effects for ecology as a result of the amendment in comparison with those reported in the main ES or AP1 ES. No avoidance and mitigation measures additional to those reported in the main ES or AP1 ES are required.

Summary of new or different likely residual significant effects as a result of the amendment

- 28.1.34 The amendment to the winching location will not result in new or different likely residual significant effects and does not change the level of significance of environmental effects as set out in the main ES and the AP1 ES (Volume 2, CFA21).

28.2 Additional land required for the upgrading of the A5 Hints Bridleway 4 overbridge to an accommodation overbridge (AP5-021-002)

- 28.2.1 The Bill provides for the raising of the A5 adjacent to Buck's Head Farm, Hints and for the existing accommodation overbridge, which carries the Heart of England Way (Hints Bridleway 4) over the A5, to be demolished and replaced by a new bridleway only bridge – the A5 Hints Bridleway 4 overbridge (refer to maps CT-05-121 and CT-06-121 grid references G5 and G6, in the main ES, Volume 2, CFA21 Map Book).
- 28.2.2 Since submission of the Bill, it has been identified that access over the A5 in this area is required for agricultural vehicles. The amendment will change the A5 Hints Bridleway 4 overbridge to an accommodation overbridge in the same location by widening the bridge and realigning and widening the access tracks to the bridge (refer to maps CT-05-121 and CT-06-121 grid references G5 and G6, in the SES4 and AP5 ES, Volume 2 Map Book). Approximately 0.2ha of additional land will be required permanently to the north of the A5 for access to the new accommodation overbridge. The Heart of England Way will continue to be diverted over the bridge.
- 28.2.3 The proposed revisions to the overbridge are not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to air quality; community; cultural heritage; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration; traffic and transport; and water resources and flood risk assessment. However, reassessment is considered to be required in respect of agriculture, forestry and soils; and ecology.

Agriculture, forestry and soils

Introduction

- 28.2.4 This section of the report describes the environmental baseline in relation to agriculture, forestry and soils that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES4 scheme.

Scope, assumptions and limitations

- 28.2.5 The assessment scope, key assumptions and limitations for agriculture, forestry and soils are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.
- 28.2.6 The area of agricultural land affected permanently by the amendment is relatively small (approximately 0.2ha) and therefore will not alter the significance of effect, or result in a different effect, on BMV agricultural land or forestry land within the CFA21 area.

Existing baseline

- 28.2.7 This amendment will directly affect one holding, Buck's Head Farm (land holding reference CFA21/11), which is a 180ha holding given over to general cropping (cereals and potatoes) with diversified interests comprising commercial units and a residential let. It is of high sensitivity to change because parts of the holding are irrigated.

*Future baseline***Construction (2017)**

- 28.2.8 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 28.2.9 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on agriculture, forestry and soils.
- 28.2.10 Most existing environmental Stewardship agreements expired in 2015 and can be replaced by a new environmental land management scheme (countryside stewardship) which, together with the new greening measures introduced by Common Agricultural Policy reform, will affect the detailed management of individual farm holdings, but are not expected to change fundamentally the baseline circumstances described.

Operation (2026)

- 28.2.11 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES.
- 28.2.12 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on agriculture, forestry and soils.

Effects arising during construction

- 28.2.13 There is a slight increase in the amount of agricultural land required temporarily from Buck's Head Farm. The area of agricultural land required temporarily from this holding will increase from 23.4ha (13% of the holding) to 23.6ha (13%). The amendment will not give rise to a new or different significant temporary effect, and will not change the level of significance of the effects reported in the main ES, which remains as major adverse (significant), due to the high impact associated with the temporary severance of land to the south-east of the farmstead during construction.
- 28.2.14 This amendment will slightly increase the amount of land required permanently from Buck's Head Farm from 20.0ha (11% of the holding) to 20.2ha (11%). The magnitude of the impact of land required permanently remains as medium (i.e. between 10% and 20% of all land farmed). In addition, whilst the accommodation overbridge will facilitate the movement of agricultural machinery to land within the holding to the north of the A5, the level of significance of the permanent effect reported in the main ES will not change from major adverse (significant), due to the high impact associated with the demolition of farm buildings.

Effects arising from operation

- 28.2.15 The amendment will not give rise to a new or different significant operational effect and will not change the level of significance of the effects reported in the main ES.

Mitigation and residual effects

- 28.2.16 No additional mitigation measures in addition to those identified in the main ES are required.

- 28.2.17 The amendment will not give rise to a new or different likely residual significant effect and will not change the level of significance of the effects on agriculture, forestry and soils reported in the main ES.

Cumulative effects

- 28.2.18 There are no new or different likely significant cumulative effects for agriculture, forestry and soils as a result of the AP₅ amendments interacting with one another, the AP₁ amendments, AP₂ amendments, AP₄ amendments or any relevant committed development.

Ecology

Introduction

- 28.2.19 This section of the report describes the environmental baseline in relation to ecology that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme.

Scope, assumptions and limitations

- 28.2.20 The key assumptions and limitations, and the methodology for determining significance of effects for ecology are as set out in Volume 1, the SMR and the SMR Addendum (Volume 5: Appendix CT-001-000/01 and CT-001-000/02 of the main ES) and in Addendum 4 to the SMR (SES₃ and AP₄ ES Volume 5: Appendix CT-001-000/5).
- 28.2.21 To address any limitations in data, a precautionary baseline has been considered according to the guidance reported in the main ES, Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment. The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the AP₅ revised scheme.

Existing baseline

- 28.2.22 The ecological baseline of the land required for the amendment has been based on field data collated for the main ES, SES₃ and AP₄ ES, aerial photography and relevant existing information gathered from national organisations and from regional and local sources including: Staffordshire Ecological Record and Staffordshire Wildlife Trust.
- 28.2.23 The summary of the baseline information relevant to the assessment of the amendment takes account of any relevant 2015 survey information provided in SES₃ and AP₄ ES, Volume 5: Appendix EC-001-003. For those receptors described in the main ES, further details are provided in Volume 2, CFA₂₁, Section 7 and in Volume 5, including maps EC-01 to EC-12.

Designated sites

- 28.2.24 There are no statutory or non-statutory designated nature conservation sites relevant to the assessment.

Habitats

- 28.2.25 No areas of ancient woodland are located within or adjacent to the land required for the amendment.

- 28.2.26 A review of aerial photography indicates that the majority of the land required for the amendment comprises arable land and an area of hardstanding in the form of an existing track to the north of the A₅. Both the arable land and area of hardstanding are considered to be of negligible value.
- 28.2.27 The hedgerow network within the land required for the construction of the original scheme was reported in the main ES as having district/borough value. An approximately 75m length of hedgerow supporting a single standard tree is located within the land required for the amendment. Taking a precautionary approach, this hedgerow could be species-rich and forms part of the wider hedgerow network within the Drayton Bassett, Hints and Weeford area. The hedgerow network is considered to be of up to district/borough value.

Protected and/or notable species

- 28.2.28 No records of protected or notable species within the land required for the amendment were reported in the main ES, or the SES₃ and AP₄ ES, Volume 5: Appendix EC-001-003.
- 28.2.29 No water bodies are located within the land required for the amendment. However, two water bodies are located within 250m. The main ES reported that one of these water bodies, located 170m to the south-east, was within a great crested newt assumed metapopulation³³ AMP28 (south of A₅, east of Weeford) of up to county/metropolitan value. The second water body, located 240m to the south-west, was surveyed in 2015 and great crested newts were not found and therefore are assumed to be absent. Both of these water bodies are located to the south of the A₅, which represents a barrier to amphibian movement to areas north of the A₅ and the land required for the amendment. Taking into account the largely suboptimal terrestrial habitat present within the land required for the amendment and the barrier to movement formed by the A₅, it is assumed that great crested newts are not present within the land required for the amendment.
- 28.2.30 The main ES reported an assemblage of bats using foraging and commuting habitats bounded by the A₅ and A₅₁, centred on Packington Moor Farm, including Tamworth Lane and Knox's Grave Lane located approximately 280m west of the land required for the amendment. This included common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species, noctule and Nathusius' pipistrelle. This assemblage of bats was reported in the main ES as being of district/borough value. There are no buildings or trees supporting known bat roosts within the land required for the amendment. A review of aerial photography indicates that a single tree is present within the hedgerow located within land required for the amendment, which could have potential to support roosting bats. Connective habitat, in the form of hedgerows, links the hedgerow and tree located within the land required for the amendment to those habitats used by the bat assemblage. Taking a precautionary approach, the tree present within the land required for the amendment could support roosting bats that are part of the assemblage of bats using foraging and commuting habitats bounded

³³ A great crested newt metapopulation is a group of associated populations made up of newts which both breed in the ponds and live in the terrestrial habitat around a cluster of ponds. The newts are likely to return to the same pond each year; however, there may be some interchange of newts between the ponds within the metapopulation. Assumed metapopulations have been identified based on a combination of desk-based information and survey results. Details of amphibian metapopulations are given in the main ES, Volume 5: Appendix EC-002-003.

by the A5 and A51. In addition, bats from this assemblage could potentially utilise the hedgerow within the area required for the amendment as a foraging area and commuting route.

- 28.2.31 The tree, hedgerow and arable fields within the land required for the amendment have the potential to support breeding birds. Considering the habitat present and the agricultural setting, it is likely that common and widespread bird species will be present in these areas and that these bird populations would be of no more than local/parish value.

Future baseline

Construction (2017)

- 28.2.32 Volume 5: Appendix CT-004-000 of the SES4 and AP5 ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP2 ES and the SES3 and AP4 ES.
- 28.2.33 None of the identified developments affect the assessment of the AP5 amendment's likely construction impacts on ecology.

Operation (2026)

- 28.2.34 Volume 5: Appendix CT-004-000 of the SES4 and AP5 ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP2 ES and the SES3 and AP4 ES.
- 28.2.35 None of the identified developments affect the assessment of the AP5 amendment's likely operational impacts on ecology.

Effects arising during construction

Avoidance and mitigation measures

- 28.2.36 The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES), which includes translocation of protected species where appropriate.

Designated sites

- 28.2.37 The amendment will not give rise to a new or different significant effect to designated sites and will not change the level of significance of the effects reported in the main ES.

Habitats

- 28.2.38 The main ES reported that the combined loss (26.5km) and severance of hedgerows within the Drayton Bassett, Hints and Weeford area will cause an adverse effect on the conservation status of the hedgerow network, which will be significant at a district/borough level. Taking a precautionary approach, an additional length of 75m of hedgerow will be lost as a result of the amendment. The amendment will give rise to a different significant effect on the conservation status of hedgerows. However, this will not change the level of significance of the effects reported in the main ES.

Protected and/or notable species

- 28.2.39 The main ES reported that the combined impacts of the loss of roosts and key foraging areas along with the severance of commuting routes on the assemblage of bats using foraging and commuting habitats bounded by the A5 and A51, will result in an adverse effect on the conservation status of the assemblage of bats that will be significant at a district/borough level. Bats from this assemblage may utilise the single standard tree for roosting and the hedgerow for foraging and commuting that are affected by the amendment. The adoption of measures within the draft CoCP will provide controls to reduce the risk of displacement of bats through the loss of roosts (if present). The amendment will give rise to a different significant effect on the conservation status of the assemblage of bats using foraging and commuting habitats bounded by the A5 and A51 due to the loss of an additional potential roost and minor additional disruption of the wider foraging and commuting resource. However, this will not change the level of significance of the effects reported in the main ES.
- 28.2.40 The amendment will result in the permanent loss of approximately 0.2ha of arable land, 75m of hedgerow and a single tree suitable to support breeding birds of local/parish value. However, the amendment will not result in a new or different significant effect on breeding birds or change the level of significance of effects reported in the main ES.

Cumulative effects

- 28.2.41 There are no new or different likely significant cumulative effects for ecology as a result of the AP5 amendments interacting with one another, the AP1 amendments, AP2 amendments, AP4 amendments or any relevant committed development.

Mitigation and residual effects

Other mitigation measures

- 28.2.42 Existing mitigation reported in the main ES to compensate for the loss of wildlife corridors that hedgerows provide includes new hedgerow creation. With the implementation of this mitigation measure, it is expected that the different effect on hedgerows will be reduced to a level which will not result in any significant effect on the conservation status of the habitat.
- 28.2.43 Existing mitigation for the loss of bat roosts within the Hints area is reported in the main ES. A freestanding, purpose built bat house will be provided south of Hints, and bat boxes will be installed within retained sections of woodland around Hints to replace potential roosts within felled trees. As such, no additional land is required for mitigation in relation to the different significant effect on the assemblage of bats using foraging and commuting habitats bounded by the A5 and A51. Replacement roosting provision will be provided following the principles of ecological mitigation identified within the SMR Addendum (main ES, Volume 5: Appendix CT-001-000/2).
- 28.2.44 No additional mitigation measures (i.e. in addition to those identified in the main ES) are required. The mitigation identified previously remains sufficient to address the different significant effects arising from the amendment.

Summary of likely residual effects

- 28.2.45 No new or different likely residual significant effects on ecological receptors occur as a consequence of the amendment. The likely significant residual effects of the AP5 revised scheme in this area are therefore unchanged from those reported in the main ES.

Effects arising from operation

- 28.2.46 There are no new or different likely residual significant operational effects for ecology as a result of the amendment in comparison with those reported in the main ES. No avoidance and mitigation measures additional to those reported in the main ES are required.

Summary of new or different likely residual significant effects as a result of the amendment

- 28.2.47 The amendment to the A5 Hints Bridleway 4 overbridge will not result in any new or different likely residual significant environmental effects and does not change the level of significance of the environmental effects, as set out in the main ES (Volume 2, CFA21).

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29 Summary of changes in CFA22

29.1 Changes to the design not requiring a change to the Bill

- 29.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES₃.

CFA22 Part 2: Additional Provision 5 Environmental Statement

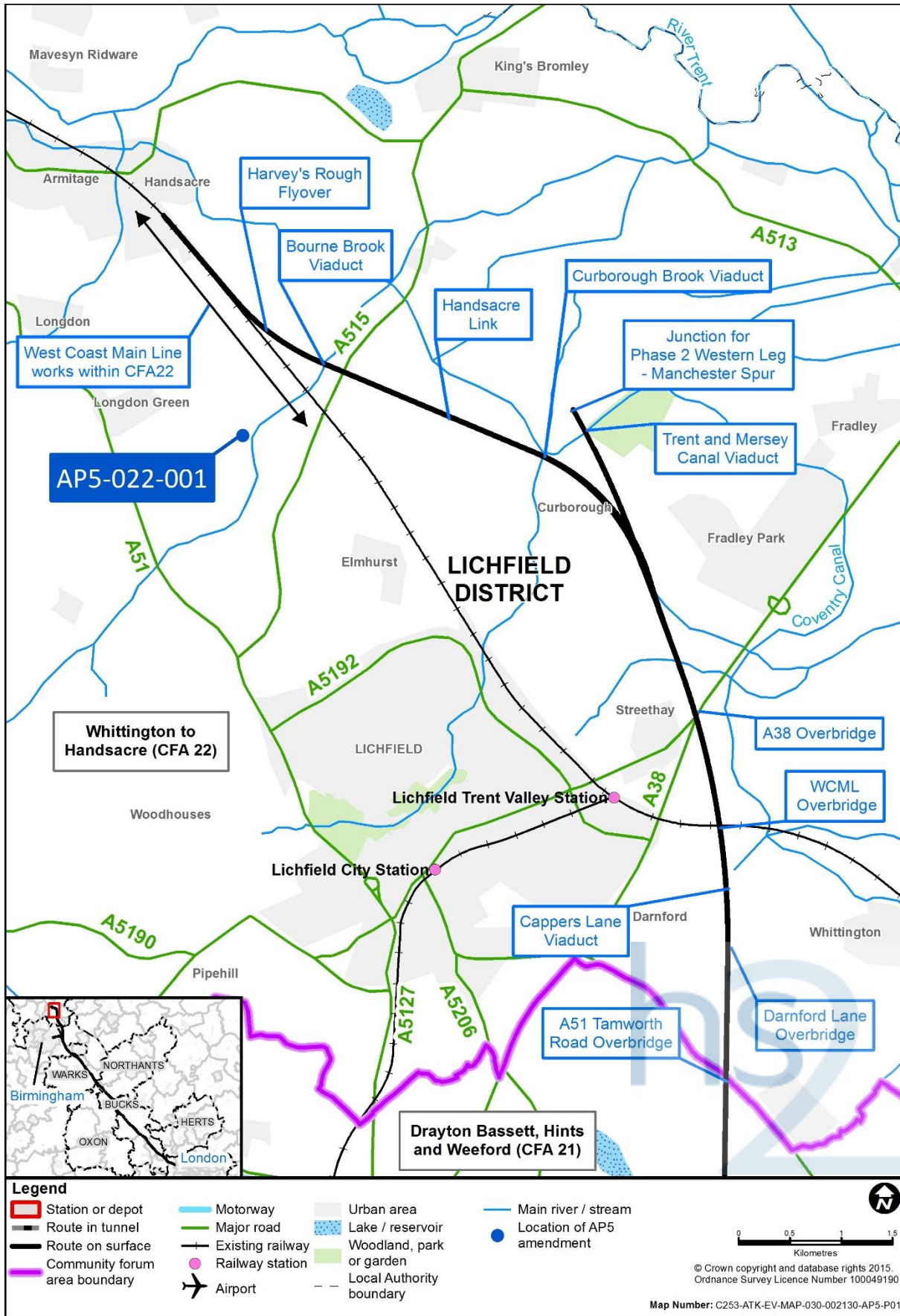
30 Summary of amendments in CFA22

30.1.1 Table 13 provides a summary of the amendment in the Whittington to Handsacre area (CFA22), and Figure 10 shows the location.

Table 13: Summary of amendment in CFA22

Name of amendment	Description of the AP2 revised scheme (as updated by the SES3 scheme)	Description of the AP5 revised scheme
Additional land required for utility winching works near Hanch Reservoir (AP5-022-001)	The temporary diversion of overhead power lines near Lichfield Road/Lichfield Golf Club, with an area for winching south-west of Hanch Reservoir.	Additional land is required temporarily for the winching of overhead power lines south-west of Hanch Reservoir. An additional area of approximately 0.4ha of land is required temporarily and approximately 0.1ha of land included in the AP2 revised scheme is no longer required.

Figure 10: Location of amendment in CFA22



31 Assessment of amendments in CFA22

31.1 Additional land required for utility winching works near Hanch Reservoir (AP₅-022-001)

- 31.1.1 The changes brought forward by AP₂ in CFA22 were substantial and included changes to both the vertical and horizontal alignment of the HS₂ route. The scale of the amendments was such that the Volume 2 report was rewritten in its entirety, effectively replacing the CFA22 Volume 2 document prepared for the main ES.
- 31.1.2 For CFA22 therefore, the AP₅ ES provides an assessment of any new or different likely residual significant environmental effects arising from the amendment compared to the AP₂ revised scheme, as updated by the SES₃ scheme, as it is assumed that the AP₅ amendment will only proceed in the event that the AP₂ amendments are enacted.
- 31.1.3 The AP₂ revised scheme provides for overhead power line diversions to the south-west of Hanch Reservoir, with an area of land immediately to the north of Lichfield Golf Course included for winching works (refer to map CT-05-129a-L1 in the AP₁ ES, Volume 2 Map Book Part 5 of 6).
- 31.1.4 Since publication of the SES and AP₂ ES, a further review of the area required for winching has been undertaken. This has established that a larger area of temporary land should be included in the Bill to provide greater flexibility on the siting of the winching equipment in this location, hence the need for this amendment (refer to map CT-05-129a-L1 in the SES₄ and AP₅ ES, Volume 2 Map Book). This will ensure that winching can be undertaken on either of the two power line alignments that are using the pylon south of Hanch Reservoir.
- 31.1.5 The additional land required is located immediately to the north-west of the land included in the AP₂ revised scheme, south-west of Hanch Reservoir, and is predominantly agricultural land. Ben Brook, which flows into Bourne Brook, flows immediately to the south of the area of land required for the amendment. There will be no physical works within the brook or the banks, and no requirement to cross the brook or remove any mature trees. Vegetation clearance will be required within the agricultural land identified but will not include removal of any hedgerow vegetation. Topsoil removal and placement of temporary surfacing will also be required. The duration of the winching works in this area is anticipated to be approximately two months.
- 31.1.6 The 0.1ha of land to the south of Ben Brook required for the AP₂ revised scheme is no longer required for the AP₅ amendment. However, an additional area of approximately 0.4ha of land is required temporarily.
- 31.1.7 The amendment is not considered to result in changes that will require a reassessment of the effects or proposed mitigation as set out in the SES and AP₂ ES with respect to: air quality; community; cultural heritage; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration; traffic and transport; and water resources and flood risk assessment. However, reassessment is considered to be required in respect of agriculture, forestry and soils and ecology.

Agriculture, forestry and soils

Introduction

- 31.1.8 This section of the report describes the environmental baseline in relation to agriculture, forestry and soils that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the AP₂ revised scheme, as updated by the SES₃ scheme.

Scope, assumptions and limitations

- 31.1.9 The assessment scope, key assumptions and limitations for agriculture, forestry and soils are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.
- 31.1.10 The area of agricultural land affected by the amendment is relatively small (0.4 ha) and therefore will not alter the significance of effect, or result in a different effect, on BMV agricultural land or forestry land within the CFA₂₂ area.

Existing baseline

- 31.1.11 This amendment will directly affect one holding, Hanchwood (land holding reference CFA_{22/15}), a 121.4ha mixed arable and livestock enterprise. This holding is considered to be of high sensitivity to change, as some of the crops are irrigated. The holding operates a commercial shoot as a diversified agricultural enterprise.

Future baseline

Construction (2017)

- 31.1.12 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and SES₃ and AP₄ ES.
- 31.1.13 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on agriculture, forestry and soils.
- 31.1.14 Most existing environmental stewardship agreements expired in 2015 and can be replaced by a new environmental land management scheme (countryside stewardship) which, together with the new greening measures introduced by Common Agricultural Policy reform, will affect the detailed management of individual farm holdings, but are not expected to change fundamentally the baseline circumstances described.

Operation (2026)

- 31.1.15 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and SES₃ and AP₄ ES.
- 31.1.16 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on agriculture, forestry and soils.

Effects arising during construction

- 31.1.17 The SES and AP₂ ES reported a major adverse (significant) temporary effect on Hanchwood. The magnitude of the impact of land required temporarily during construction was assessed as medium (i.e. 13% of the holding), but the potential impact of construction work on the holding's commercial shoot was assessed as a disruptive effect of high magnitude.
- 31.1.18 The amendment will increase the amount of land required temporarily from this holding by 0.4ha, in comparison with the AP₂ revised scheme. The amount of land required temporarily from this holding will increase from 15.4ha (13% of the holding) to 15.8 (13%). Therefore, the magnitude of the impact of land required temporarily will remain as medium. This will not give rise to a new or different significant effect and will not change the level of the significance of the major temporary adverse (significant) effect associated with the potential impact of construction work on the holding's commercial shoot as reported in the SES and AP₂ ES.
- 31.1.19 The amendment does not require any land permanently from this holding. Therefore, the amendment will not cause any new or different significant effects and it will not change the level of the significance of the permanent effect reported in the SES and AP₂ ES, i.e. major/moderate adverse (significant) due to a medium severance impact.

Effects arising from operation

- 31.1.20 This amendment will not give rise to a new or different likely residual significant operational effect and will not change the level of significance of the effects reported in the SES and AP₂ ES.

Mitigation and residual effects

- 31.1.21 No additional mitigation measures in addition to those identified in the SES and AP₂ ES are required.
- 31.1.22 The amendment will not result in a new or different likely residual significant effect and will not change the level of the significance of the effects on agriculture, forestry and soils reported in the SES and AP₂ ES.

Cumulative effects

- 31.1.23 There are no new or different likely significant cumulative effects for agriculture, forestry and soils as a result of the AP₅ amendment interacting with the AP₄ amendments or any relevant committed development.

Ecology*Introduction*

- 31.1.24 This section of the report describes the environmental baseline in relation to ecology that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the AP₂ revised scheme, as updated by the SES₃ scheme.

Scope, assumptions and limitations

- 31.1.25 The key assumptions and limitations, and the methodology for determining significance of effects for ecology are as set out in Volume 1, the SMR and the SMR Addendum (Volume 5: Appendix CT-001-000/01 and CT-001-000/02 of the main ES) and in Addendum 4 to the SMR (SES₃ and AP₄ ES, Volume 5: Appendix CT-001-000/5).
- 31.1.26 To address any limitations in data, a precautionary baseline has been considered according to the guidance reported in the main ES, Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment. The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the AP₅ revised scheme.

Existing baseline

- 31.1.27 The ecological baseline of the land required for the amendment has been based on field data collated for the main ES, the SES and AP₂ ES and the SES₃ and AP₄ ES, aerial photography and relevant existing information gathered from national organisations and from regional and local sources including: Staffordshire Ecological Record and Staffordshire Wildlife Trust.
- 31.1.28 A summary of the baseline information relevant to the assessment of the amendment is provided below. For those receptors described in the SES and AP₂ ES, further details are provided in the SES and AP₂ ES, Volume 2, CFA22, Section 11 and Volume 5, including maps EC-01, EC-04, EC-05, EC-11 and EC-12. For those receptors described in the SES₃ and AP₄ ES, further details are provided in the SES₃ and AP₄ ES, Volume 2, CFA22, Section 3 and Volume 5, including maps EC-04.

Designated sites

- 31.1.29 There are no statutory or non-statutory designated nature conservation sites or ancient woodland relevant to the assessment.

Habitats

- 31.1.30 The land required for the amendment consists primarily of part of a single arable field. Arable land is considered to be of negligible ecological value.
- 31.1.31 Ben Brook forms the southern boundary of the amendment and was not reported in the SES and AP₂ ES. The brook is a tributary of Bourne Brook, which was valued in the SES and AP₂ ES as being of district/borough value. Taking a precautionary approach, it is considered that Ben Brook is also of up to district/borough value.
- 31.1.32 Small areas of scattered trees are present within the land required for the amendment, formed as bankside vegetation adjacent to Ben Brook. These areas of scattered trees are considered to be of no more than local/parish value.
- 31.1.33 Eight water bodies are located within 250m of the land required for the amendment, although none of these are located within the land required for the amendment. The water bodies were reported in the SES and AP₂ ES to be of local/parish value.

Protected and/or notable species

- 31.1.34 No records of protected or notable species within the land required for the amendment were reported in the SES and AP₂ ES or SES₃ and AP₄ ES.
- 31.1.35 There are eight water bodies located within 250m of the land required for the amendment. Six of these water bodies are within great crested newt assumed metapopulation³⁴ AMP₃₂ (near Hanch Reservoir), with the closest water body supporting breeding great crested newt located approximately 170m north-west of the land required for the amendment. Part 1 of the SES₃ and AP₄ ES reported that AMP₃₂ comprises ten water bodies, and supports a medium population of great crested newt which is of county/metropolitan value.
- 31.1.36 Two unsurveyed water bodies are located approximately 140m and 220m south-east of the land required for the amendment. The SES and AP₂ ES reported that water bodies which have not been surveyed could support breeding populations of great crested newt of medium population size class, and taking a precautionary approach, these populations were assessed as having up to county/metropolitan value. Following the same precautionary approach, assumed great crested newt populations in the two suitable water bodies within 250m of the land required for the amendment are assessed as of up to county/metropolitan value.
- 31.1.37 There are no buildings or trees supporting known bat roosts within the land required for the amendment. A number of trees are adjacent to Ben Brook which could have potential to support roosting bats. The SES and AP₂ ES reported an assemblage of bats using the habitats fronting Shaw Lane and Tuppenhurst Lane including Bourne Brook, John's Gorse and Harvey's Rough, located approximately 730m north-east of the land required for the amendment. This included common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species, noctule and Nathusius's pipistrelle. Connective habitat, in the form of hedgerows, watercourses and woodland link the trees located within the land required for the amendment to those used by the bat assemblage. Taking a precautionary approach, the trees present within the land required for the amendment could support roosting bats that are part of the assemblage of bats using the habitats fronting Shaw Lane and Tuppenhurst Lane. In addition, bats from this assemblage could potentially utilise watercourses and trees within the area required for the amendment as foraging areas and commuting routes. This assemblage of bats was reported in the SES and AP₂ ES as being of district/borough value.
- 31.1.38 The SES and AP₂ ES reported that populations of otter were present within watercourses in the area, including Bourne Brook. As Ben Brook is a tributary of Bourne Brook, it is considered likely that otters use this watercourse as part of their home range. The SES and AP₂ ES reported the otter populations using watercourses within the Whittington to Handsacre area to be of district/borough value.
- 31.1.39 The SES and AP₂ ES reported the potential presence of populations of water vole using watercourses in the areas. As Ben Brook is a tributary of Bourne Brook, it is

³⁴ A great crested newt metapopulation is a group of associated populations made up of newts which both breed in the ponds and live in the terrestrial habitat around a cluster of ponds. The newts are likely to return to the same pond each year; however, there may be some interchange of newts between the ponds within the metapopulation. Assumed metapopulations have been identified based on a combination of desk-based information and survey results. Details of amphibian metapopulations are given in the main ES Volume 5: Appendix EC-002-003.

considered likely that water voles use this watercourse. A potential population of water vole using Ben Brook would be of up to county/metropolitan value.

- 31.1.40 The trees and arable land within the land required for the amendment have the potential to support breeding birds. Considering the habitat present and the agricultural setting, it is likely that common and widespread bird species will be present in these areas and that these bird populations would be of no more than local/parish value.

Future baseline

Construction (2017)

- 31.1.41 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and SES₃ and AP₄ ES.
- 31.1.42 None of the identified developments affect the assessment of the AP₅ amendment's likely construction impacts on ecology.

Operation (2026)

- 31.1.43 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and SES₃ and AP₄ ES.
- 31.1.44 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on ecology.

Effects arising during construction

Avoidance and mitigation measures

- 31.1.45 The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES), which includes translocation of protected species where appropriate.

Designated sites

- 31.1.46 The amendment will not give rise to new or different significant effects on designated sites and will not change the level of significance of the effects reported in the SES and AP₂ ES.

Habitats

- 31.1.47 The amendment will not require any physical works within Ben Brook or to its banks. As such, no adverse impacts are expected to watercourses.
- 31.1.48 The amendment will result in the loss of an additional 0.4ha of arable land. A 0.1ha area of improved grassland to the south of Ben Brook required for the AP₂ revised scheme is no longer required as a result of the amendment.
- 31.1.49 These changes will not generate any new or different significant effects, or change the level of significance of the effects reported in the SES and AP₂ ES.

Protected and/or notable species

- 31.1.50 The SES and AP₂ ES reported that no water bodies within AMP₃₂ would be lost to the AP₂ revised scheme. However, small areas of terrestrial habitat in the form of arable land (approximately 0.7ha) and hedgerow (approximate 60m length) would be lost. The SES and AP₂ ES reported that this loss of terrestrial habitat would not result in an adverse effect on the conservation status of the great crested newt metapopulation and would not be significant. No water bodies will be lost as a result of the amendment, although the amendment will result in an increase in the amount of terrestrial habitat loss within AMP₃₂, comprising 0.4ha of arable land 170m away from the nearest water body. The implementation of measures within the CoCP will ensure that there will be no killing or injury of great crested newts (if present) as a result of the amendment. The amendment will not result in a new significant effect on great crested newt metapopulation AMP₃₂ or the assumed populations present in water bodies south-east of the land required for the amendment.
- 31.1.51 The SES and AP₂ ES reported adverse effects on the conservation status of the assemblage of bats using habitats fronting Shaw Lane and Tuppenhurst Lane, which will be significant at a district/borough level. This was associated with the loss of confirmed and potential bat roosts, and the permanent loss and severance of foraging and commuting habitat. No trees will be lost and no impacts to Ben Brook are expected as a result of the amendment. The amendment will not result in a new or different significant effect on the assemblage of bats using habitats fronting Shaw Lane and Tuppenhurst Lane, and will not change the level of significance of the effects on the bat assemblages reported in the SES and AP₂ ES.
- 31.1.52 The amendment will result in the loss of approximately 0.4ha of arable land, which is suitable to support breeding birds of local/parish value. The amendment will not result in a new or different significant effect on breeding birds or change the level of significance of effects reported in the SES and AP₂ ES.

Cumulative effects

- 31.1.53 There are no new or different likely significant cumulative effects for ecology as a result of the AP₅ amendment interacting with the AP₄ amendments or any relevant committed development.

Mitigation and residual effects

Other mitigation measures

- 31.1.54 No additional mitigation measures (i.e. in addition to those identified in the SES and AP₂ ES) are required.

Summary of likely residual effects

- 31.1.55 No new or different likely residual significant effects on ecological receptors occur as a consequence of the amendment. The significant residual effects of the AP₅ revised scheme in this area are therefore unchanged from those reported in the SES and AP₂ ES.

Effects arising from operation

- 31.1.56 There are no new or different likely residual significant operational effects for ecology as a result of the amendment in comparison with those reported in the SES and AP₂ ES. No avoidance and mitigation measures additional to those reported in the SES and AP₂ ES are required.

Summary of new or different likely residual significant effects as a result of the amendment

- 31.1.57 The amendment to the winching location will not result in any new or different likely residual significant effects and does not change the level of the significance of the environmental effects as set out in the SES and AP₂ ES (Volume 2, CFA22).

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32 Summary of changes in CFA₂₄

32.1 Changes to the design not requiring a change to the Bill

- 32.1.1 There are no changes to the design that do not require a change to the Bill, affecting this CFA which will give rise to new or different significant environmental effects to those reported in the main ES, the SES or the SES₃.

CFA24 Part 2: Additional Provision 5 Environmental Statement

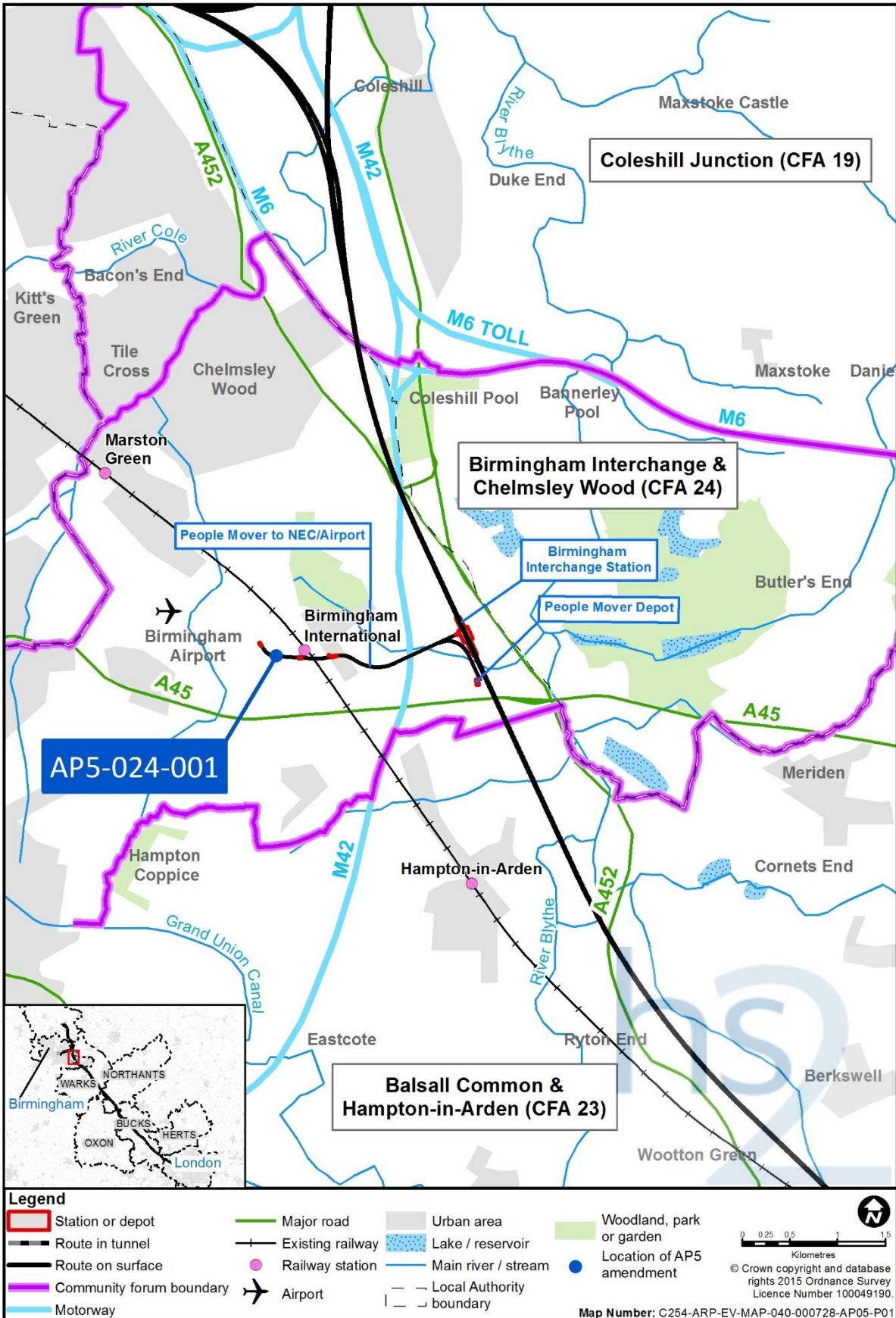
33 Summary of amendments in CFA24

33.1.1 Table 14 provides a summary of the amendment in the Birmingham Interchange and Chelmsley Wood area (CFA24), and Figure 11 shows the location.

Table 14: Summary of amendment in CFA24

Name of amendment	Description of the SES4 scheme	Description of the AP5 revised scheme
<p>Additional land required for the realignment of the people mover between the Birmingham Airport and National Exhibition Centre (NEC) people mover stops (AP5-024-001)</p>	<p>The Bill provides for a people mover to enable a direct link between the new Birmingham Interchange station, the NEC complex, Birmingham International station and Birmingham Airport. The people mover will be up to 17m in height and approximately 2.3km in length. The people mover will operate from the Birmingham Interchange station, moving south-west crossing over the M42, East Way, Pendigo Lake and the Rugby to Birmingham Line before continuing on to Birmingham Airport. There will be four stops along the route.</p> <p>Construction of the people mover will be managed by six compounds in the area.</p>	<p>The amendment will change the alignment of the people mover between the NEC people mover stop and the Birmingham Airport people mover stop, to avoid precluding the potential for a new hotel at Birmingham Airport.</p> <p>The change in alignment will require the relocation of both the Birmingham Airport and Birmingham International station people mover stops.</p> <p>A footbridge included within the SES4 scheme, to connect the existing Birmingham International station to the Birmingham International station people mover stop, will be increased in length by 15m. The new alignment of the people mover will require approximately 480m² of additional land from outside the existing Bill limits to facilitate this change.</p> <p>The people mover Birmingham International station satellite compound will be moved approximately 50m north to avoid the new alignment of the people mover, within existing Bill limits.</p>

Figure 11: Location of amendment in CFA24



34 Assessment of amendments in CFA24

34.1 Additional land required for the realignment of the people mover between the Birmingham Airport and National Exhibition Centre people mover stops (AP5-024-001)

- 34.1.1 The Bill provides a people mover to enable a direct link between the new Birmingham Interchange station, the NEC complex, Birmingham International station and Birmingham Airport. The people mover will be up to 17m in height and approximately 2.3km in length. The people mover will operate from the Birmingham Interchange station, running in a south-westerly and then westerly direction crossing over the M42, East Way, Pendigo Lake and the Rugby to Birmingham Line before continuing on to Birmingham Airport. There will be four stops along the route of the people mover.
- 34.1.2 Construction of the people mover would be managed by six compounds in the area: Birmingham Interchange station car park (west) and people mover depot; people mover (M42); people mover Pendigo Lake; people mover NEC station; people mover Birmingham International station; and people mover Birmingham Airport station satellite compounds (see maps CT-05-106-L1 and CT-05-106-L2 in the main ES, Volume 2, CFA24 Map Book).
- 34.1.3 Since submission of the Bill, Birmingham Airport has communicated its aspirations to build a new hotel, adjacent to Diamond House offices, although an application for planning consent has yet to be made (and would be outside the scope of the Bill). To avoid the site of the proposed new hotel, further consideration has been given to the alignment of the people mover so as not to preclude the potential for future development.
- 34.1.4 The amendment will realign the people mover between the NEC people mover stop and the Birmingham Airport people mover stop, within Bill limits, so as to avoid the site of the proposed hotel. The revised alignment will require the relocation of the Birmingham International station people mover stop, approximately 50m east and the Birmingham Airport people mover stop, approximately 50m north-east of the location proposed in the Bill (see map CT-06-106-L1 and CT-06-106-L2, in the SES4 and AP5 ES, Volume 2, CFA 24 Map Book).
- 34.1.5 A footbridge included within the SES4 scheme to connect the existing Birmingham International station to the Birmingham International people mover stop, will be increased in length by 15m within the limits of the Bill. Approximately 480m² of additional land is required from outside of the Bill limits to implement this amendment (see CT-06-106-L2, in the SES4 and AP5 ES, Volume 2, CFA 24 Map Book).
- 34.1.6 The construction of the realigned people mover will require the relocation of the people mover Birmingham International station satellite compound within Bill limits, approximately 50m north of the location proposed in the Bill. The construction of the people mover will be from the compounds described in the main ES. The access and route to the compound will remain the same as described in the main ES. There will be no change to the construction programme due to this amendment.

- 34.1.7 The provision of the realigned people mover is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to: agriculture, forestry and soils; air quality; community; cultural heritage; ecology; land quality; landscape and visual assessment; socio-economics; and water resources and flood risk assessment. However, there are changes where reassessment is considered to be required in respect of sound, noise and vibration; and traffic and transport.

Sound, noise and vibration

Introduction

- 34.1.8 This section of the report describes the environmental baseline in relation to sound, noise and vibration that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme.

Scope, assumptions and limitations

- 34.1.9 The assessment scope, key assumptions and limitations for sound, noise and vibration are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Existing baseline

- 34.1.10 The existing baseline sound, noise and vibration information for the Birmingham Interchange and Chelmsley Wood area is as reported in the main ES (Volume 2, CFA24, Section 11 and Volume 5: Appendix SV-002-024).

Future baseline

Construction (2017)

- 34.1.11 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, the SES and AP₂ ES and in the SES₃ and AP₄ ES.
- 34.1.12 Planning reference PL/2015/51216/PPFL – a new 223 bedroom hotel (Radisson Blu Hotel) with restaurant and conference facilities at Jetstream Road, Birmingham Airport, Solihull, has been granted planning permission since the submission of the main ES, and is relevant to the assessment.

Operation (2026)

- 34.1.13 Volume 5: Appendix CT-004-000 of the SES₄ and AP₅ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, the SES and AP₂ ES and in the SES₃ and AP₄ ES.
- 34.1.14 None of the identified developments affect the assessment of the AP₅ amendment's likely operational impacts on sound, noise and vibration.

Effects arising during construction

- 34.1.15 The amendment to realign the people mover between the NEC people mover stop and the Birmingham Airport people mover stop will relocate some of the construction works assessed in the main ES.
- 34.1.16 The main ES reported significant daytime construction noise effects in the vicinity of the amendment at the closest NEC buildings to the people mover, Exhibition Hall 1, the Pavilion area and the Diamond House office building. Significant daytime construction noise effects were also identified at the hotels immediately adjacent to the airport (Novotel, Ibis and Etap). An exceedance of the night-time impact screening criterion was also predicted at these hotels. However, based on the limited magnitude and duration of the impact, a significant night-time effect was not identified.
- 34.1.17 An assessment has been undertaken to determine whether the construction works associated with the amendment will result in any new or different likely significant effects, using the significance criteria detailed in the main ES (Volume 5: Appendix SV-001-000).
- 34.1.18 The SES₄ and AP₅ ES, Volume 5: Appendix SV-003-024 details the relevant changes to the results reported in the main ES, Volume 5: Appendix SV-003-024, Sound, noise and vibration assessment.
- 34.1.19 No change to the significant effect reported in the main ES at the closest NEC buildings to the people mover is anticipated due to the amendment.
- 34.1.20 The relocation of the people mover works slightly further away (approximately 50m) from the Diamond House offices results in the removal of the significant construction noise effect reported in the main ES at this location.
- 34.1.21 The significant effect at the Novotel, Ibis and Etap hotels remains, though the magnitude and duration of the noise impacts are reduced slightly. The typical monthly daytime construction noise levels are reduced by 1dB (to 58dB) and no change to worst-case monthly daytime construction noise levels is anticipated. The duration of the daytime impact is reduced from 15 months to 9 months. The exceedance of the night-time screening criterion is removed, as typical and worst-case night-time monthly noise levels are reduced by 2dB (to 48dB and 53dB respectively).
- 34.1.22 Due to the distance from the people mover works a significant construction noise effect is not anticipated at the new Radisson Blu hotel (planning reference PL/2015/51216/PPFL), which has been granted planning permission since the submission of the main ES.

Effects arising from operation

- 34.1.23 The proposed amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in the main ES.

Mitigation and residual effects

- 34.1.24 No additional mitigation measures (i.e. in addition to those identified in the main ES) are proposed.

- 34.1.25 The amendment removes the significant residual temporary effect reported in the main ES at the Diamond House offices, and gives rise to a different significant effect at the Novotel, Ibis and Etap hotels.

Cumulative effects

- 34.1.26 There are no new or different likely significant cumulative effects for sound, noise and vibration as a result of the AP₅ amendment acting in combination with the AP₄ amendments, the AP₁ amendments, the AP₂ amendments or any relevant committed development.

Traffic and transport

Introduction

- 34.1.27 This section of the report describes the environmental baseline in relation to traffic and transport that is relevant to the assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the SES₄ scheme.

Scope, assumptions and limitations

- 34.1.28 The assessment scope, key assumptions and limitations for traffic and transport are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 -000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

Existing baseline

- 34.1.29 The existing baseline for traffic and transport is as reported in the main ES (Volume 2, CFA₂₄, Section 12 and Volume 5: Appendix TR-001-000).

Future baseline

Construction

- 34.1.30 The future baseline for construction for traffic and transport is reported in the main ES (Volume 2, CFA₂₄, Section 12 and Volume 5: Appendix TR-001-000).
- 34.1.31 Future baseline traffic volumes in the peak hours are forecast to grow by approximately 11% by 2021 compared to 2015.

Operation (2026)

- 34.1.32 The future baselines for operation in 2026 and 2041 for traffic and transport are reported in the main ES (Volume 2, CFA₂₄, Section 12 and Volume 5: Appendix TR-001-000).
- 34.1.33 Future baseline traffic volumes in the peak hours are forecast to grow by approximately 19% by 2026 compared to 2015.
- 34.1.34 Future baseline traffic volumes in the peak hours are forecast to grow by approximately 39% by 2041 compared to 2015.

Effects arising during construction

- 34.1.35 The main ES reported that the construction of the people mover would result in the temporary loss of car parking, including designated spaces, at the NEC, Birmingham International station and Birmingham Airport. These losses were estimated as:
- up to 720 car parking spaces (4%) at the NEC for up to 12 months;
 - up to 290 spaces (13%) at Birmingham International station for up to two years;
 - approximately 200 spaces (8%) from the West Car Park for up to two years; and
 - up to 280 designated spaces (2%) at Birmingham Airport for up to two years. This includes spaces in the taxi holding area and spaces for car hire.
- 34.1.36 However, due to the large amount of car parking available around the NEC, Birmingham International station and Birmingham Airport and the potential to phase construction works to reduce the number of spaces lost and the durations over which they are lost, it was considered that the effect of the loss of spaces at the NEC and the West Car Park would not be significant. A minor adverse significant effect was reported for a loss of spaces at Birmingham International station and a moderate adverse significant effect was reported at Birmingham Airport due to the loss of designated spaces.
- 34.1.37 The amendment to realign the people mover between the NEC people mover stop and the Birmingham Airport people mover stop will result in additional car parking spaces being lost temporarily from the West Car Park. The number of spaces temporarily required in the West Car Park will increase from approximately 200 spaces (8%) to approximately 400 spaces (16%) and will be required for up to two years. The increase in spaces lost will result in a new minor adverse significant effect on the West Car Park. The amendment does not change the significant adverse effects reported in the main ES at Birmingham International station (minor adverse parking effect) or Birmingham Airport (moderate adverse parking effects in respect of designated spaces).
- 34.1.38 The amendment will not result in any new or different significant effects from construction traffic, compared with those identified in the main ES.
- 34.1.39 The significant effects that result from construction of the AP5 revised scheme are shown on SES4 and AP5 ES map TR-03-154-L1 in the Volume 5 Map Book.

Effects arising from operation

- 34.1.40 The main ES considered the permanent effects on car parking spaces at the NEC, Birmingham International station, the West Car Park and Birmingham Airport as a result of the people mover alignment. It was estimated that the following car parking and taxi holding spaces would be permanently lost as a result of the people mover:
- approximately 96 car parking spaces (0.5%) at the NEC;
 - approximately 92 spaces at Birmingham International station;

- approximately 16 spaces from the West Car Park; and
- approximately 16 designated taxi holding spaces (30.8%) at Birmingham Airport.

- 34.1.41 The effects as a result of the loss of parking spaces are generally not significant. However, the main ES reported a moderate adverse significant effect at Birmingham Airport due to the permanent loss of approximately 16 designated taxi holding spaces.
- 34.1.42 The amendment to realign the people mover and the Birmingham Airport people mover stop will avoid the designated taxi holding spaces. Therefore the amendment will remove the moderate adverse effect on the taxi holding spaces at Birmingham Airport reported in the main ES.
- 34.1.43 The removal of the significant operational effect with the AP₅ revised scheme is shown on SES₄ and AP₅ ES map TR-04-154-L1 in the Volume 5 Map Book.

Mitigation and residual effects

- 34.1.44 No mitigation measures in addition to those reported in the main ES (Volume 2, CFA24) are required.
- 34.1.45 The amendment will result in a new temporary minor adverse residual significant effect on car parking spaces at the West Car Park during construction. The amendment will remove the moderate adverse residual significant operational effect reported in the main ES on designated taxi holding spaces at Birmingham Airport.

Cumulative effects

- 34.1.46 The assessment has taken into account cumulative effects, including planned development by taking account of background traffic growth, as well as traffic and transport impacts of works being undertaken in other areas.
- 34.1.47 There are no new or different likely significant cumulative effects for traffic and transport as a result of the AP₅ amendment acting in combination with any of the AP₄ amendments, AP₁ amendments or AP₂ amendments.

Summary of new or different likely residual significant effects as a result of the amendment

- 34.1.48 The amendment to realign the people mover between the NEC people mover stop and the Birmingham Airport people mover stop will give rise to a different significant effect compared to that reported in the main ES at the Novotel, Ibis and Etap hotels and will remove the significant effect reported in the main ES on Diamond House offices during construction for sound, noise and vibration.
- 34.1.49 The amendment will result in a new temporary minor adverse residual significant effect on car parking spaces at the West Car Park during construction. The amendment will remove the moderate adverse residual operational effect that was reported in the main ES on designated taxi holding spaces at Birmingham Airport.

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 4 and
Additional Provision 5 Environmental Statement
Volume 3 | Route-wide effects

December 2015

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Structure of the HS₂ Supplementary Environmental Statement 4 and the Additional Provision 5 Environmental Statement

The Supplementary Environmental Statement 4 (SES₄) and the Additional Provision 5 Environmental Statement (AP₅ ES) comprise:

- Non-technical summary (NTS): this provides a summary in non-technical language of the SES₄ (Part 1) and the AP₅ 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 (referred to as 'the main ES') as updated by the subsequent SESs and AP ES documents;
- Volume 1: introduction to the SES₄ and the AP₅ ES. This introduces the design changes included within the SES₄ and amendments, which have resulted in the need to amend the Bill, within the AP₅ ES. The report explains the scope, methodology, assumptions and limitations of the environmental assessment, and approach to consultation;
- Volume 2: community forum area (CFA) reports and map book. These describe the design changes included within the SES₄ (Part 1) and amendments within the AP₅ ES (Part 2). Any new or different likely significant environmental effects arising from these changes and amendments in each CFA, compared to those reported in the main ES, as updated by the SES, SES₂ and SES₃ documents (and SES₄ for the AP₅ amendments) are reported. The AP₁, AP₂, AP₃ and AP₄ amendments are also taken into account where relevant;
- Volume 3: route-wide effects. This reports new or different likely significant route-wide effects arising from the design changes included within the SES₄ (Part 1) and amendments within the AP₅ ES (Part 2) compared to those reported in the main ES as updated by SES, SES₂, SES₃ (and SES₄ for the AP₅ amendments). The AP₁, AP₂, AP₃ and AP₄ amendments are also taken into account where relevant;
- Volume 5: appendices and map book. This contains environmental information and associated maps in support of the other volumes of the SES₄ and AP₅ ES; and
- glossary of terms and list of abbreviations. This contains any new or different terms and abbreviations used throughout the SES and AP ES reports, additional to those included in the main ES.

SES₄ and AP₅ ES Volume 3 – Route-wide effects

There are no off-route design changes included within the SES₄ or amendments within the AP₅ ES, so no Volume 4 has been prepared.

1 Introduction

1.1 Background to High Speed Two

1.1.1 The Bill for high speed rail between London and the West Midlands 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 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 report.

1.1.2 Since the deposit of the Bill, the need for a number of amendments (i.e. changes that require amendments to the Bill) to the scheme have been identified. These have been promoted in Parliament through the following four APs, which were each accompanied by an ES:

- AP1: deposited in Parliament in September 2014. This focused on community forum areas (CFAs) 7 (Colne Valley) to 26 (Washwood Heath to Curzon Street);
- AP2: deposited in Parliament in July 2015. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street);
- AP3: deposited in Parliament in September 2015. This focused on CFAs 1 (Euston station and approach) to 3 (Primrose Hill to Kilburn (Camden)); and
- AP4: deposited in Parliament in November 2015. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street).

1.1.3 A number of other changes to the design, which do not require amendments to the Bill, have also been made. Any new or different significant effects that were likely to result from such changes as well as from changes to construction assumptions, new environmental baseline information, and corrections to the main ES were reported in the following SESs:

- SES: submitted alongside the AP2 ES. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street);
- SES2: submitted alongside the AP3 ES. This focused on CFAs 1 (Euston station and approach) to 5 (Northolt Corridor); and
- SES3: submitted alongside the AP4 ES. This focused on CFAs 4 (Kilburn (Brent) to Old Oak Common) to 26 (Washwood Heath to Curzon Street).

1.2 Introduction to the SES4 and AP5 ES for High Speed Two

1.2.1 Since submission of the SES3 and AP4 ES, the need for a number of further amendments has been identified in the following CFAs:

- CFA6 (South Ruislip to Ickenham);
- CFA7 (Colne Valley);

- CFA₁₁ (Stoke Mandeville and Aylesbury);
- CFA₁₂ (Waddesdon and Quainton);
- CFA₁₅ (Greatworth to Lower Boddington);
- CFA₂₀ (Curdworth to Middleton);
- CFA₂₁ (Drayton Bassett, Hints and Weeford);
- CFA₂₂ (Whittington to Handsacre); and
- CFA₂₄ (Birmingham Interchange and Chelmsley Wood).

- 1.2.1 These amendments include additional land required for generally minor works. These amendments are being promoted through AP₅. The associated AP₅ ES describes the amendments and reports the associated likely significant environmental effects.
- 1.2.2 There are two design changes in CFAs 10 (Dunsmore, Wendover and Halton) and 13 (Calvert, Steeple Claydon, Twyford and Chetwode) that do not require amendments to the Bill and a correction to the main ES in CFA₁₁ (Stoke Mandeville and Aylesbury). Any new or different likely significant effects that are likely to result from these changes are reported in a fourth SES ('SES₄').
- 1.2.3 These additional amendments and design changes have arisen through the High Speed Rail (London – West Midlands) Bill Select Committee ('the Select Committee') process, and ongoing discussions with petitioners and key stakeholders including utility undertakers.
- 1.2.4 A formal consultation will be undertaken on the SES₄ and AP₅ ES. There will also be a petitioning period for those directly and specially affected by the changes. Any petitions against these changes will be heard by the Select Committee in due course.
- 1.2.5 A description of the changes and amendments assessed within the SES₄ and AP₅ ES is provided in Section 2 of Volume 1.
- 1.2.6 As the SES₄ and AP₅ ES provides an update to the previously published main ES and subsequent SESs and AP ESs it should be read in conjunction with them.

1.3 Terminology used to describe the scheme

- 1.3.1 In order to differentiate between the original scheme assessed as part of the main ES and subsequent changes, the following terms in Table 1 are used throughout the SES₄ and AP₅ ES.

Table 1: Scheme descriptions

Scheme name	Definition	Relevant CFAs
the original scheme	the Bill scheme submitted to Parliament in November 2013, which was assessed in the main ES	1 to 26
the AP ₁ revised scheme	the original scheme as amended by the AP submitted in September 2014	7 to 26 (excluding 8, 23 and 25)

SES₄ and AP₅ ES Volume 3 – Route-wide effects

Scheme name	Definition	Relevant CFAs
the SES scheme	the original scheme with the design changes described in the SES submitted in July 2015	4 to 26
the AP ₂ revised scheme	the SES scheme as amended by the AP ₂ submitted in July 2015	4 to 26 (excluding 8)
the SES ₂ scheme	the original scheme as updated by the SES scheme, with the design changes described in the SES ₂ submitted in September 2015	1 to 5 (i.e. this applies in the London area only)
the AP ₃ revised scheme	the SES ₂ scheme as amended by the AP ₃ submitted in September 2015	1 to 3 (i.e. this applies in the London area only)
the SES ₃ scheme	the SES ₂ scheme with the design changes described in the SES ₃ submitted in October 2015	4 to 26 (excluding 5 & 21)
the AP ₄ revised scheme	the SES ₃ scheme as amended by the AP ₄ submitted in October 2015	4 to 26 (excluding 14 & 21)
the SES ₄ scheme	the SES ₃ scheme with design changes described in the SES ₄ submitted in December 2015	10 and 13
the AP ₅ revised scheme	the SES ₄ scheme as amended by the AP ₅ submitted in December 2015	6, 7, 11, 12, 15, 20, 21, 22 and 24

1.3.2 The following terms are also used to differentiate between design changes included in the SES₄ and those included in the AP₅ ES:

- 'SES₄ design changes' – changes to the scheme reported in the SES₄ that do not require amendments to the Bill; and
- 'AP₅ amendments' – changes to the scheme reported in the AP₅ ES that require amendments to the Bill.

1.4 Scope of this report

1.4.1 Route-wide effects are those considered to be appropriately assessed at a geographical scale greater than that presented within the Volume 2, CFA reports. A formal scoping process has been undertaken for the SES₄ changes and AP₅ amendments in order to determine whether there is potential for the changes or amendments to give rise to new or different significant route-wide environmental effects compared with those reported in Volume 3 of the main ES and where relevant the AP₁ ES, the SES and AP₂ ES, the SES₂ and AP₃ ES and the SES₃ and AP₄ ES.

1.4.2 These new or different route-wide effects are reported in the SES₄ (Part 1) or AP₅ ES (Part 2) of this document, depending on whether they arise from SES₄ changes or AP₅ amendments. Parts 1 and 2 are divided into environmental topics, which are

presented in the same order as reported in Volume 3 of the main ES. Part 2 takes account of the impacts of the SES₄ changes reported in Part 1.

- 1.4.3 Some environmental topics have been scoped out of the route-wide assessment, since their effects are localised in extent and have no potential to cause significant route-wide effects. These environmental topics are: air quality, community, landscape and visual assessment, and sound, noise and vibration. Following the scoping process, it was also determined that there was no potential for new or different significant route-wide effects for land quality as a consequence of the SES₄ changes or AP₅ amendments, and this topic is not reported in this volume. For those topics that are included in this volume, the assessment has found that there are no new significant environmental effects at a route-wide level, and only limited differences to those reported in Volume 3 of the previous ESs.
- 1.4.4 The climate, and waste and material resources assessments are reported at a route-wide level in this volume rather than within the Volume 2, CFA reports. This follows the approach taken in the main ES.
- 1.4.5 Given that the methodology for each environmental topic assesses effects in a way appropriate to that topic, the approach to route-wide effects varies between environmental topics. The extent and basis of the route-wide assessments is explained in each of the environmental topic sections in Volume 3 of the main ES. The Scope and Methodology Report (SMR) (Volume 5: CT-001-000/1 of the main ES); the SMR Addendum (Volume 5: CT-001-000/2 of the main ES); the SMR Addendum 3 (Volume 5: CT-001-000/4 of the SES₂ and AP₃ ES); and the SMR Addendum 4 (Volume 5: CT-001-000/5 of the SES₃ and AP₄ ES) should also be referred to.
- 1.4.6 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 submitted in support of the Bill. Implementation of these measures has been assumed in this SES₄ and AP₅ ES.
- 1.4.7 The route-wide effects of the SES₄ scheme (Part 1) and the AP₅ revised scheme (Part 2) are also considered cumulatively taking into account any relevant AP₁, AP₂, AP₃ and AP₄ amendments. This is only referred to if there is the potential for new or different significant cumulative effects.
- 1.4.8 Following the approach taken for the main ES, committed developments are considered within the assessments but only referred to if there is the potential for new or different significant cumulative effects.

1.5 Structure of this report

1.5.1 The report is structured as follows:

- Section 1: Introduction;

Part 1: Supplementary Environmental Statement 4

- Section 2: Chilterns AONB;
- Section 3: Agriculture, forestry and soils;

- Section 4: Climate;
- Section 5: Cultural heritage
- Section 6: Ecology;
- Section 7: Socio-economics;
- Section 8: Traffic and transport;
- Section 9: Waste and material resources;
- Section 10: Water resources and flood risk assessment;
- Section 11: Phase One and Phase Two combined impacts; and

Part 2: Additional Provision 5 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 4

2 Chilterns Area of Outstanding Natural Beauty

2.1 Introduction

- 2.1.1 Volume 3 of the main ES included an assessment of effects on the special landscape qualities of the Chilterns Area of Outstanding Natural Beauty (AONB).
- 2.1.2 Volume 3 of the AP1 ES and the SES and the AP2 ES reported that the changes and amendments 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. It was therefore concluded that none of the changes or amendments would result in any changes in the assessment of effects on the Chilterns AONB as presented in Volume 3 of the main ES.
- 2.1.3 An assessment of the Chilterns AONB was not included within Volume 3 of the SES2 and the AP3 ES because the SES2 changes and the AP3 amendments were limited to CFAs 1 to 5 and would not lead to new or different significant effects on the AONB.
- 2.1.4 Part 1 of Volume 3 of the SES3 and the AP4 ES reported that the SES3 changes were not of sufficient scale to give rise to any new or different effects on the special landscape qualities of the AONB. Part 2 of the SES3 and the AP4 ES reported different significant effects on the Chilterns AONB resulting from the extension to the Chiltern tunnel from Mantle's Wood portal to South Heath green tunnel north portal (AP4-009-001). Locally to the Misbourne Valley, the AP4 amendment would change the level of significance of effects reported in the main ES from major adverse to moderate adverse. However, for the AONB as a whole, the amendment would not give rise to new or different significant effects and would not change the level of significance of the effects reported in Volume 3 of the main ES.

2.2 Changes to the assessment of effects

- 2.2.1 There is one SES4 change with the potential to generate new or different significant effects on the Chilterns AONB; the additional noise mitigation at Wendover (SES4-010-001). A detailed assessment of the effects on individual landscape character areas within the AONB is provided in CFA10, Volume 2 of the SES4 and the AP5 ES.
- 2.2.2 The SES4 change includes:
- the extension of the Wendover green tunnel southwards by 100m;
 - a 6m high noise fence barrier approximately 780m in length along the eastern side of the route, between the Small Dean viaduct and the new location of the south portal, replacing the 4m high noise barrier proposed at this location in the SES3 scheme;
 - a 6m high noise fence barrier located within the cutting at the northern portal

of the Wendover green tunnel on the east side. This will run along the eastern edge of the access track and around the area where the portal buildings are situated, a distance of approximately 340m;

- earthworks along the south portal to reduce the visual impact of the noise fence barriers and extension of the green tunnel; and
- a revised realignment of 400kV power lines across the HS2 route to address construction constraints.

2.2.3 The part of the scheme affected by the SES₄ change runs to the west of Wendover and parallel to the A413 and Marylebone to Aylesbury Line corridor. The extended green tunnel, new and raised noise fence barriers, and earthworks are considered minor changes in the context of the larger-scale changes in construction and operation that will result from the original scheme and will affect a small area of the AONB as a whole. The SES₄ design change will not change the extent of land required for the scheme and no additional areas of woodland will be removed.

2.2.4 The SES₄ change will not give rise to any new or different significant effects on the special landscape qualities of the AONB, and will not result in any change in the assessment of effects on the Chilterns AONB compared to those of the SES₃ scheme or cumulatively with any other AP amendments.

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 significant route-wide effects for agriculture, forestry and soils, operational effects are not considered further.

3.1.2 Volume 3 of the AP₁ ES, and the SES and the AP₂ ES reported that the SES changes or AP₁ and AP₂ amendments were not of sufficient scale to result in any new or different significant route-wide effects during construction.

3.1.3 Agriculture, forestry and soils was not included within Volume 3 of the SES₂ and the AP₃ ES, because the SES₂ changes and AP₃ amendments were limited to CFAs 1 to 5 (predominantly urban) and would not lead to any new or different significant effects.

3.1.4 Volume 3 of the SES₃ and the AP₄ ES reported that the SES₃ changes and AP₄ amendments were not of sufficient scale to result in any new or different significant route-wide effects during construction.

3.2 Changes to the assessment of effects

3.2.1 There are no SES₄ changes that will give rise to any new or different significant route-wide effects on agriculture, forestry and soils during construction compared to those of the SES₃ scheme or cumulatively with any other AP amendments.

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 assessment.
- 4.1.3 Volume 3 of the SES and the AP2 ES reported that the SES changes would have a negligible impact on the carbon footprint reported in Volume 3 of the main ES. The AP2 revised scheme was reported to lead to an increase in construction GHG emissions, however the overall conclusions of the assessment remain as in Volume 3 of the main ES.
- 4.1.4 Volume 3 of the SES2 and the AP3 ES reported that the SES2 changes would lead to an increase in construction GHG emissions, as well as a negligible increase in operational GHG emissions. None of the AP3 amendments were considered to materially impact the original scheme's carbon footprint and therefore no further assessment was carried out. Despite the increased carbon footprint as a result of the SES2 changes, the overall conclusions of the climate assessment for the AP3 revised scheme remain as reported in Volume 3 of the main ES.
- 4.1.5 Volume 3 of the SES3 and the AP4 ES reported that none of the SES3 changes were considered to materially impact the original scheme's carbon footprint and therefore no further assessment was carried out. The AP4 amendments were reported to lead to an increase in construction GHG emissions however, the overall conclusions of the assessment remain as reported in Volume 3 of the main ES.
- 4.1.6 As identified above, of the SES, SES2 and SES3 changes, only the SES2 changes have been identified as having the potential to materially impact the original scheme's carbon footprint. Accordingly, the last update to the carbon footprint is reported in Part 1 of the Volume 3 SES2 and the AP3 ES and forms the baseline against which the SES4 changes are assessed.

4.2 Changes to the assessment of effects

- 4.2.1 A scoping assessment was undertaken to determine if the SES4 changes would be likely to result in a material difference to the GHG emissions reported in Part 1 of the Volume 3 SES2 and the AP3 ES (see Section 2 in Volume 1 for a summary of SES4 design changes).
- 4.2.2 The methodology for determining which SES4 changes are material to GHG emissions comprises quantitative and qualitative assessments. See the Appendix CL-002-000 (Volume 5 of this SES4 and the AP5 ES) for a more detailed description of the process.
- 4.2.3 The SES4 changes were reviewed both individually and as a group following this approach. The potential GHG emissions of the SES4 changes have been considered in the context of the GHG emissions reported in Part 1 of the Volume 3 SES2 and the AP3 ES, to determine whether each change is considered to be potentially material or not.

- 4.2.4 The outcome of this scoping assessment identified that none of the SES₄ changes would materially impact the carbon footprint as reported in Part 1 of the Volume 3 SES₂ and the AP₃ ES, and therefore no further assessment was carried out.
- 4.2.5 For further detail on the scoping outcomes, see Appendix CL-002-000 (Volume 5 of this SES₄ and AP₅ ES).
- 4.2.6 The SES₄ changes have also been considered in combination with the SES₃ changes and it was considered that these changes would not materially impact the carbon footprint as reported in Part 1 of the Volume 3 SES₂ and the AP₃ ES.
- 4.2.7 The SES₄ changes considered cumulatively with the other AP amendments would not change the conclusions as reported in Part 1 of the Volume 3 SES₂ and the AP₃ ES.

5 Cultural heritage

5.1 Introduction

- 5.1.1 Volume 3 of the main ES reported that the original scheme would not have a direct physical effect on any World Heritage Site, and would not require the demolition of any Grade I or Grade II* listed building. Since the submission of the main ES, the war memorial at Euston Square Gardens, that was due to be removed as a result of the construction of the original scheme, has been regraded from a Grade II to Grade II*.
- 5.1.2 Volume 3 of the main ES also reported that across the entire route of the original scheme, a number of designated assets would be significantly affected through direct physical impact.
- 5.1.3 The changes and amendments reported in the AP₁ ES and the SES and the AP₂ ES were not considered to require an assessment of heritage assets at a route-wide level and this topic was scoped out.
- 5.1.4 Volume 3 of the SES₂ and the AP₃ ES reported that no new heritage assets would be affected as a result of the SES₂ changes and AP₃ amendments.
- 5.1.5 Volume 3 of the SES₃ and the AP₄ ES reported that no new heritage assets would be affected as a result of the SES₃ changes. One length of historic hedgerow and five previously affected ancient woodland areas will no longer be affected as a result of the AP₄ amendments.

5.2 Changes to the assessment of effects

- 5.2.1 There are no new designated assets significantly affected through direct physical impact as a result of the SES₄ changes. The following heritage assets are directly affected by the SES₄ scheme:
- heritage assets comprising:
 - one registered battlefield;
 - one scheduled monument;
 - one Grade II* listed building entry;
 - 17 Grade II listed buildings entries; and

- alteration to a curtilage wall to a Grade I listed building; and
- historic landscape assets comprising:
 - two Grade II* registered parks and gardens;
 - 81 lengths of historic hedgerow; and
 - 37 areas of ancient woodland¹.

6 Ecology

6.1 Introduction

- 6.1.1 Volume 3 of the main ES described the likely significant effects on ecological resources that will occur at 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.
- 6.1.2 Volume 3 of the AP₁ ES reported that the AP₁ amendments led to only minor changes in the ecological effects reported in the main ES. These changes were not of sufficient scale to generate new or different significant effects at a route-wide level.
- 6.1.3 Part 1 of Volume 3 of the SES and AP₂ ES reported new and different significant adverse effects as a consequence of changes relating to designated sites, the ancient woodland inventory, areas that have been identified as likely to be added to the ancient woodland inventory, and additional data relating to bat populations at Waddesdon and Quainton (CFA₁₂), Calvert, Steeple Claydon, Twyford and Chetwode (CFA₁₃), and Radstone (CFA₁₄).
- 6.1.4 Part 1 of Volume 3 of the SES₂ and AP₃ ES reported a different significant adverse effect on ecological networks due to the removal of the HS₁–HS₂ Link.
- 6.1.5 Part 1 of Volume 3 of the SES₃ and AP₄ ES reported a 1.6ha decrease in the extent of ancient woodland losses at Ranston Covert and Battlesford Wood (CFA₇, Colne Valley) compared to the SES₂ scheme. This reduces ancient woodland losses as a consequence of the SES₃ scheme to 42.9ha. The total number of ancient woodlands affected by the SES₃ scheme would remain 37. Thus a different significant adverse residual effect on an irreplaceable resource was reported. However, the effect remains significant at the national level.
- 6.1.6 This section of the SES₄ and AP₅ ES identifies any new or different significant effects on ecological resources to those reported in Volume 3 of the main ES, and where relevant updated by the SES, SES₂ and/or SES₃, as a consequence of SES₄ changes. It also considers the SES₄ scheme with any relevant AP₁, AP₂, AP₃ and AP₄ amendments, to identify the potential for new or different 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.

¹ Volume 3 of the main ES reported 19 ancient woodland sites were 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. In addition a further 11 woodland sites were identified as likely to be added to the ancient woodland inventory and therefore are assumed to be ancient.

6.2 Changes to the assessment of effects

- 6.2.1 The changes as a result of the SES₄ scheme are unlikely to result in any new or different significant effects on ecology at a route-wide level compared to those of the SES₃ scheme or cumulatively with any other AP amendments.

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, the SES and the AP₂ ES, the SES₂ and the AP₃ ES and the SES₃ and the AP₄ ES reported that the changes and 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 SES₄ scheme are not considered to result in any new or different significant route-wide effects in comparison with the SES₃ scheme or cumulatively with any other AP amendments.

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 any new or different significant effects at a route-wide level for traffic and transport.
- 8.1.3 The SES changes in Volume 3 of the SES and the AP₂ ES resulted in minor local changes, which did not generate any new or different significant route-wide effects. The AP₂ amendments would not generate new or different significant effects at a route-wide level for traffic and transport.
- 8.1.4 Volume 3 of the SES₂ and the AP₃ ES and the SES₃ and the AP₄ ES reported that the changes and amendments would not generate any 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 The changes as a result of the SES₄ scheme are not considered to result in any new or different significant route-wide effects for traffic and transport in comparison with the SES₃ scheme or cumulatively with any other AP amendments.

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 the AP₁ amendments would not give rise to issues that would be of importance to the consideration of new or different likely significant environmental route-wide effects with regards to waste and material resources.
- 9.1.3 Volume 3 of the SES and AP₂ ES reported that the SES changes would not generate new or different likely significant route-wide effects. It further reported that the construction of the AP₂ revised scheme would lead to an increase in the total quantity of inert waste and that the resultant effect associated with the off-site disposal of this waste would be minor adverse, compared to negligible as reported in the main ES. The total quantities of non-hazardous and hazardous waste associated with the construction of the AP₂ revised scheme were greater than those reported in the main ES, however the level of significance remained as reported in the main ES.
- 9.1.4 Volume 3 of the SES₂ and AP₃ ES reported that the SES₂ changes and AP₃ amendments would not result in any new or different likely significant route-wide effects.
- 9.1.5 Volume 3 of the SES₃ and AP₄ ES reported that the SES₃ changes would not generate new or different likely significant route-wide effects. It was further reported that the construction of the AP₄ revised scheme would lead to an increase in the total quantity of inert, non-hazardous and hazardous waste, however the level of significance remained as reported in Part 2 of the SES and the AP₂ ES.

9.2 Changes to the assessment of effects

- 9.2.1 There are no SES₄ changes that would be of importance to the consideration of waste and material resources on a route-wide basis. The changes as a result of the SES₄ scheme are therefore not considered to result in any new or different likely significant environmental route-wide effects compared to those reported in the SES₃ and the AP₄ 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 were 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 Volume 3 of the main ES also included a route-wide Water Framework Directive (WFD) compliance assessment for the water bodies potentially affected by the original scheme.
- 10.1.3 A water resources and flood risk assessment and WFD compliance assessment were not included within Volume 3 of the AP₁ ES, as the AP₁ amendments were not considered likely to generate new or different significant route-wide effects or affect WFD water bodies at the catchment scale.
- 10.1.4 A water resources and flood risk assessment was not included within Volume 3 of the SES and the AP₂ ES, as the SES changes and AP₂ amendments were not considered likely to generate new or different significant route-wide effects. Compliance with the WFD was considered in Volume 3 of the SES and the AP₂ ES and it was concluded that, as for the original scheme, there would be no breach of the WFD as a result of the SES changes and AP₂ amendments.
- 10.1.5 A water resources and flood risk assessment and WFD compliance assessment were not included within Volume 3 of the SES₂ and the AP₃ ES as the SES₂ changes and AP₃ amendments were not considered likely to generate new or different significant route-wide effects or affect WFD water bodies at the catchment scale.
- 10.1.6 A water resources and flood risk assessment was not included within Volume 3 of the SES₃ and the AP₄ ES, as the SES₃ changes and AP₄ amendments were not considered likely to generate new or different significant route-wide effects. Compliance with the WFD was considered in Volume 3 of the SES₃ and the AP₄ ES and it was concluded that, as for the original scheme, there would be no breach of the WFD as a result of the SES₃ changes and AP₄ amendments.

10.2 Changes to the assessment of effects

- 10.2.1 A scoping exercise determined that the SES₄ changes did not have the potential to give rise to new or different significant route-wide effects in terms of water resources and flood risk. The scoping exercise also determined that the SES₄ changes would not affect WFD water bodies at the catchment scale.
- 10.2.2 It is concluded that there will be no breach of the WFD as a result of the SES₄ changes.

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 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, the SES and AP₂ ES, the SES₂ and AP₃ ES and the SES₃ and AP₄ ES reported that the changes and amendments would result in very minor or negligible changes to the figures given in the main ES.

11.2 Summary of changes to combined impacts

11.2.1 The SES₄ changes will result in very minor or negligible changes to the combined impact figures given in Volume 3 of the SES₃ and the AP₄ ES.

Part 2: Additional Provision 5 Environmental Statement

12 Chilterns Area of Outstanding Natural Beauty

12.1 Introduction

12.1.1 Volume 3 of the main ES, the AP1 ES and the SES and the AP2 ES included an assessment of effects on the special landscape qualities of the Chilterns AONB.

12.1.2 Section 2 in Part 1 of this volume reports that the SES4 changes are not of sufficient scale to give rise to any new or different effects on the special landscape qualities of the AONB.

12.2 Changes to the assessment of effects

12.2.1 There are no AP5 amendments that will give rise to new or different significant effects on the special landscape qualities of the AONB compared to those of the SES4 scheme or cumulatively with any other AP amendments.

13 Agriculture, forestry and soils

13.1 Introduction

13.1.1 Volume 3 of the main ES and subsequent SES and AP ES reports provided an assessment of the route-wide impacts and likely significant effects on agriculture, forestry and soils arising from the scheme. Since it is considered that during operation there will be no significant route-wide effects for agriculture, forestry and soils, operational effects are not considered further.

13.1.2 Section 3 in Part 1 of this volume reports that the SES4 changes will not generate any new or different significant route-wide effects.

13.2 Changes to the assessment of effects

13.2.1 The amount of agricultural land required for the construction of the AP5 revised scheme will be negligible in comparison to the land required for the SES4 scheme. None of the amendments proposed as part of the AP5 revised scheme are of sufficient scale to result in any new or different significant route-wide effects compared to those of the SES4 scheme or cumulatively with any other AP amendments.

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. Construction GHG emissions in

the main ES were reported at 5,590,000 tonnes carbon dioxide equivalent (tCO₂e)² under the central scenario (Scenario A)³, and 5,300,000 tCO₂e under a stretch scenario (Scenario B)⁴.

- 14.1.2 Section 4 in Part 1 of this volume reports that of the subsequent SES, SES₂, SES₃ and SES₄ changes, only the SES₂ changes have been identified as having the potential to materially impact the original scheme's carbon footprint. Construction GHG emissions were recalculated in SES₂ to take account of the revised scheme for the Euston station and approach area and the removal of the HS₁–HS₂ link, and were reported at 5,815,000 tCO₂e (Scenario A) and 5,460,000 tCO₂e (Scenario B). Accordingly, the last update to the carbon footprint is reported in Part 1 of the Volume 3 SES₂ and the AP₃ ES and forms the baseline against which the AP₅ amendments are assessed.

14.2 Scope, assumptions and limitations

- 14.2.1 A scoping exercise identified which of the AP₅ amendments are considered to be potentially material from a GHG emissions perspective. For further detail on the scoping methodology applied see Appendix CL-002-000 (Volume 5 of this SES₄ and the AP₅ ES).
- 14.2.2 The outcome of the scoping assessment identified that none of the AP₅ amendments would materially impact the carbon footprint as reported in Part 1 of the Volume 3 SES₂ and AP₃ ES, therefore no further assessment was carried out.
- 14.2.3 For further detail on the scoping outcomes see Appendix CL-002-000 (Volume 5 of this SES₄ and the AP₅ ES).
- 14.2.4 The AP₅ amendments have also been considered in combination with the SES₃ changes and SES₄ changes, and it was considered that these changes would not materially impact the carbon footprint as reported in Part 1 of the Volume 3 SES₂ and the AP₃ ES.
- 14.2.5 The AP₅ amendments considered cumulatively with the other AP amendments would not change the conclusions as reported in Part 1 of the SES₂ and the AP₃ ES Volume 3.

15 Cultural heritage

- 15.1.1 Section 5 in Part 1 of this volume reports that no new heritage assets would be affected as a result of the SES₄ changes.
- 15.1.2 There are no changes to the list of affected heritage assets in Section 5 in Part 1 of this volume as a result of the AP₅ amendments.

² Tonnes carbon dioxide equivalent is a metric used to compare the emissions from various greenhouse gases based on their global warming potential.

³ The construction carbon footprint is presented as a range based on two scenarios. Scenario A is a central figure based on the likely improvements in the carbon efficiency within the construction industry by 2020. For further information see Section 5.1 of Volume 3 of the main ES.

⁴ The construction carbon footprint is presented as a range based on the two scenarios. Scenario B is a "stretch" figure assuming that the construction industry is able to implement its research on carbon efficiency. For further information see Section 5.1 of Volume 3 of the main ES.

16 Ecology

16.1 Introduction

- 16.1.1 Volume 3 of the main ES described the likely significant effects on ecological resources that will occur 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.
- 16.1.2 This section of the report identifies any new or different significant effects on ecological resources relevant at a route-wide level due to the AP5 amendments, and compares with those reported for the SES4 scheme (see Section 6 in Part 1 of this volume). The route-wide effects of the SES4 scheme are unchanged from those of the SES3 scheme.
- 16.1.3 The assessment presented in this section of the report also considers the AP5 revised scheme in combination with any relevant AP1, AP2, AP3 and AP4 amendments to identify the potential for any new or different 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.

16.2 Changes to the assessment of effects

- 16.2.1 The AP5 amendments will not result in any new or different significant effects of relevance at the route-wide level, in comparison with the SES4 scheme or cumulatively with any other AP amendments.

17 Socio-economics

17.1 Introduction

- 17.1.1 Volume 3 of the main ES presented a route-wide assessment of the direct and indirect socio-economic effects.
- 17.1.2 Section 7 in Part 1 of this volume reports that none of the SES, SES2, SES3 and SES4 changes will generate any new or different significant route-wide effects for socio-economics.

17.2 Changes to the assessment of effects

- 17.2.1 None of the AP5 amendments are considered likely to result in any new or different significant route-wide effects in comparison with the SES4 scheme or cumulatively with any other AP amendments.

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.
- 18.1.2 Section 8 in Part 1 of this volume reports that the SES4 scheme would not generate any new or different significant route-wide effects.

18.2 Changes to the assessment of effects

- 18.2.1 None of the AP5 amendments are considered likely to result in any new or different significant route-wide effects for traffic and transport in comparison with the SES4 scheme or cumulatively with any other AP amendments.

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 Section 9 in Part 1 of this volume reports that the SES4 changes would not generate any new or different significant route-wide effects on waste and material resources.

19.2 Changes to the assessment of effects

- 19.2.1 There are no AP5 amendments that would be of importance to the consideration of waste and material resources on a route-wide basis. The changes as a result of the AP5 revised scheme are therefore not considered to result in any new or different likely significant environmental route-wide effects in comparison with the SES4 scheme or cumulatively with any other AP amendments.

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. 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 Section 10 in Part 1 of this volume reports that the SES4 changes would not generate any new or different significant route-wide effects on water resources and flood risk.
- 20.1.3 Volume 3 of the main ES also included a route-wide WFD compliance assessment for the water bodies potentially affected by the original scheme. The main ES route-wide

WFD compliance assessment concluded 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 original scheme.

- 20.1.4 Section 10 in Part 1 of this volume reports that there would be no breach of the WFD as a result of the SES₄ changes.

20.2 Changes to the assessment of effects

- 20.2.1 A scoping exercise determined that the AP₅ amendments do not have the potential to give rise to new or different significant route-wide effects in terms of water resources and flood risk. The scoping exercise did however determine that there was potential for the AP₅ amendments to impact on WFD compliance in one water body, the Mid-Chilterns Chalk. The focus of the AP₅ revised scheme assessment is therefore on WFD.

Change in potential risks to water body status

Surface water

- 20.2.2 The scoping exercise did not identify any AP₅ amendments that have the potential to affect surface water bodies to any greater or lesser extent than already assessed for the original scheme and the subsequent SES schemes and AP revised schemes.

Groundwater

- 20.2.3 There is one AP₅ amendment that has the potential to affect the Mid-Chilterns Chalk groundwater body. An effect on this water body was identified for the original scheme and subsequent SES schemes and AP revised schemes.
- 20.2.4 The AP₅ amendment (AP₅-007-001) will involve the installation of two new pylons and piling into a groundwater source protection zone (SPZ₂) within the Mid-Chilterns Chalk groundwater body. The risk of piling on WFD status and compliance was assessed in the main ES.
- 20.2.5 There is no change to the risk assessed for the Mid Chilterns Chalk groundwater body as a result of the AP₅ amendments.

WFD Compliance

- 20.2.6 As stated in Volume 3 of the main ES, the SES and AP₂ ES and the SES₃ and AP₄ 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.
- 20.2.7 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 AP₅ revised scheme design, incorporated mitigation measures and on the current status of 61 surface water bodies and 16 groundwater bodies. The assessment assumes that all other APs are accepted and key avoidance and mitigation measures, for example turbidity treatment as presented in the main ES, the SES and AP₂ ES and in the SES₃ and AP₄ ES, are in place and approved by the Environment Agency.

20.2.8 The assessment concluded that there will be no breach of the WFD as a result of the AP₅ amendments.

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.

21.1.2 Section 11 in Part 1 of this volume reports that the SES₄ changes would result in very minor or negligible changes to the figures in the SES₃ and the AP₄ ES.

21.2 Summary of changes to combined impacts

21.2.1 Table 2 presents a summary of the potential total impacts of Phase One (the original scheme, AP₂ revised scheme, AP₃ revised scheme, AP₄ revised scheme and AP₅ revised 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 main ES or assessments prepared in support of the January 2012 updated AoS Report for Phase One⁵. The data for the AP₂, AP₃, AP₄ and AP₅ revised schemes is taken from the corresponding SES and the AP₂ ES, SES₂ and the AP₃ ES, SES₃ and the AP₄ ES and SES₄ and the AP₅ ES. The Phase Two data is taken from the Phase Two Sustainability Statement⁶.

Table 2: Combined impacts of Phase One (original scheme, AP₂ revised scheme, AP₃ revised scheme, AP₄ revised scheme and AP₅ revised scheme) and Phase Two

	Phase One					Phase Two (Phase Two Manchester and Phase Two Leeds)	Overall Total (Phase One AP ₅ revised scheme and Phase Two)
	Original scheme	AP ₂ revised scheme ⁷	AP ₃ revised scheme ⁸	AP ₄ revised scheme ⁹	AP ₅ revised scheme ¹⁰		
Route characteristics (km)							
Total	225.5 ¹¹	216.0 ¹²	216.0 ¹³	216.0 ¹³	216.0 ¹³	335.2	551.2
At grade	0.1	0 ¹⁴	0 ¹⁴	0 ¹⁴	0 ¹⁴	24.1	24.1
Tunnel	53.4	47.9 ¹⁴	47.9 ¹⁴	49.4 ¹⁴	49.5 ^{14,15}	27.3	76.7

⁵ Booz & Co. Temple (2012), High Speed Two London to West Midlands Appraisal of Sustainability – Post-Consultation Route Refinements.

⁶ 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.

⁷ The AP₂ revised scheme assumes that the AP₁ amendments have been implemented.

⁸ The AP₃ revised scheme assumes that the AP₁ and AP₂ amendments have been implemented.

⁹ The AP₄ revised scheme assumes that the AP₁, AP₂ and AP₃ amendments have been implemented.

¹⁰ The AP₅ revised scheme assumes that the AP₁, AP₂, AP₃ and AP₄ amendments have been implemented.

¹¹ This total includes another 14.5km attributed to retaining walls and stations.

¹² This total includes another 13.1km attributed to retaining walls and stations. This total includes the removal of the HS₁-HS₂ Link.

¹³ This total includes another 13.0km attributed to retaining walls and stations. This total includes the removal of the HS₁-HS₂ Link.

¹⁴ This total includes the removal of the HS₁-HS₂ Link.

¹⁵ In order to account for the 100m extension of the Wendover green tunnel, the length of route in tunnel has been increased and the length of route on embankment has been equally reduced.

SES4 and AP5 ES Volume 3 – Route-wide effects

	Phase One					Phase Two (Phase Two Manchester and Phase Two Leeds)	Overall Total (Phase One AP5 revised scheme and Phase Two)
	Original scheme	AP2 revised scheme ⁷	AP3 revised scheme ⁸	AP4 revised scheme ⁹	AP5 revised scheme ¹⁰		
Cutting	73.8	76.0 ¹⁴	76.0 ¹⁴	74.7 ¹⁴	74.7 ¹⁴	130.9	205.6
Viaduct	18.5	16.4 ¹⁴	16.4 ¹⁴	16.3 ¹⁴	16.3 ¹⁴	47.0	63.3
Embankment	65.2	62.6 ¹⁴	62.6 ¹⁴	62.6 ¹⁴	62.5 ^{14, 15}	105.9	168.5
Property and settlements							
Demolitions (residential)	339 dwellings ^{16, 17} (265 buildings)	335 dwellings (248 buildings)	333 dwellings (246 buildings)	326 dwellings (218 buildings)	326 dwellings (218 buildings)	278	604
Demolitions ¹⁸ (community)	21 community facilities ¹⁹	21 ²⁰ community facilities	20 community facilities	19 community facilities	19 community facilities	4	23
Demolitions (commercial/retail)	404 units (312 buildings) ²¹	408 units (312 buildings)	368 units (295 buildings)	371 units (308 buildings)	372 units (309 buildings) ²²	227	610
Demolitions (manufacturing/industrial)						11	
Total demolitions (including residential) ²³	600 buildings ²⁴	582 buildings	560 buildings	545 buildings	546 buildings	520	1,066
Employment and housing							
Permanent jobs created	2,200 ²⁵	2,200 ²⁵	2,200 ²⁵	2,200 ²⁵	2,200 ²⁵	1,400	3,100 ²⁶

¹⁶ 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).

¹⁷ This figure excludes future baseline (i.e. committed residential development not currently completed).

¹⁸ This total includes the community facilities that are demolished and not reprovided.

¹⁹ 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.

²⁰ Two community facilities are being re-provided: Burton Green Community Hall and Wendover Cricket Ground.

²¹ This figure includes some properties which also provide community resources, e.g. public house, local services.

²² A warehouse building on Channel Gate Road was not identified as a building to be demolished in the main ES. It has now been added to the list of demolitions. (The demolition of the warehouse unit and effect on this business and their employees will not give rise to a new significant effect compared to those reported in the main ES).

²³ This total includes the total number of residential, community, commercial/retail/manufacturing/industrial & miscellaneous buildings.

²⁴ 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).

²⁵ Indicative direct operational employment figure which has been estimated to the nearest 100 jobs.

²⁶ Figures are not additive as some jobs associated with classic compatible services for Phase One will transfer to Phase Two.

SES4 and AP5 ES Volume 3 – Route-wide effects

	Phase One					Phase Two (Phase Two Manchester and Phase Two Leeds)	Overall Total (Phase One AP5 revised scheme and Phase Two)
	Original scheme	AP2 revised scheme ⁷	AP3 revised scheme ⁸	AP4 revised scheme ⁹	AP5 revised scheme ¹⁰		
Construction jobs created	14,600 ²⁷	14,600 ²⁷	14,600 ²⁷	14,600 ²⁷	14,600 ²⁷	10,000	24,600
Jobs supported ²⁸	30,000 ²⁹	30,000 ²⁹	30,000 ²⁹	30,000 ²⁹	30,000 ²⁹	48,700-70,300	78,700-100,300
Houses supported	5,620 ²⁹	5,620 ²⁹	5,620 ²⁹	5,620 ²⁹	5,620 ²⁹	5,200-7,600	10,820-13,200
Jobs displaced	8,430 ³⁰	8,510 ³¹	7,900 ³²	7,950 ³³	7,950 ³⁴	4,800	12,750
Noise							
People affected by noise (WebTAG annoyance) (mitigated scheme)	~623 ³⁵	~623 ³⁵	~556	~541	~535	~1,600 ³⁶	~2,135
People affected by noise (WebTAG annoyance) per km	~2.9 ³⁵	~2.9 ³⁵	~2.8	~2.7	~2.7	~4.8	~3.9
Landscape							
AONB crossed at surface (km)	8.9	8.9	8.9	7.6	7.6	0	7.6
Cultural heritage							
Scheduled Monuments directly	1	1	1	1	1	1	2

²⁷ Number reported as an approximate equivalent of permanent full time construction jobs.

²⁸ Figures account for jobs displaced.

²⁹ Booz & Co. Temple (2012), *High Speed 2 London to West Midlands Appraisal of Sustainability - Post Consultation Route Refinements*.

³⁰ 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.

³¹ 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.

³² 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 AP3 revised scheme.

³³ 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 AP4 revised scheme.

³⁴ 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 AP5 revised scheme.

³⁵ The main ES reported that approximately 525 people will be affected by noise due to the original scheme. A number of areas were omitted from this calculation including Euston and the HS1-HS2 Link. The updated figure provided in the table accounts for these omitted areas.

³⁶ Figure rounded in Phase Two Sustainability Statement, July 2013.

SES4 and AP5 ES Volume 3 – Route-wide effects

	Phase One					Phase Two (Phase Two Manchester and Phase Two Leeds)	Overall Total (Phase One AP5 revised scheme and Phase Two)
	Original scheme	AP2 revised scheme ⁷	AP3 revised scheme ⁸	AP4 revised scheme ⁹	AP5 revised scheme ¹⁰		
affected							
Registered battlefields directly affected	1	1	1	1	1	0	1
Grade I & II* structures directly affected	1 ³⁷	1 ³⁷	2 ³⁸	2	2	0	2
Grade II structures directly affected	18	18	17 ³⁹	17	17	8	25
Registered parks and gardens directly affected	2	2	2	2	2	0	2
Conservation areas directly affected	2	2	2	2	2	8	10
Biodiversity and wildlife							
Natura 2000 sites affected	0	0	0	0	0	0	0
Sites of Special Scientific Interest directly affected	2	2	2	3 ⁴⁰	3	13	16
Habitats of Principal Importance	41	41	41	41	41	62	n/a ⁴¹

³⁷ This comprises the alteration to a curtilage wall to a Grade 1 Listed building.

³⁸ This figure includes the removal of the war memorial at Euston Square Gardens that has been re-graded from a Grade II to Grade II* since the submission of the main ES.

³⁹ This figure includes the removal of the war memorial at Euston Square Gardens that has been re-graded from a Grade II to Grade II* since the submission of the main ES.

⁴⁰ Additional SSSI affected as a result of the AP4 scheme is the Frays Farm Meadows SSSI.

⁴¹ Phase One and Phase Two will affect many of the same Habitats of Principal Importance types therefore these figures are not additive.

SES4 and AP5 ES Volume 3 – Route-wide effects

	Phase One					Phase Two (Phase Two Manchester and Phase Two Leeds)	Overall Total (Phase One AP5 revised scheme and Phase Two)
	Original scheme	AP2 revised scheme ⁷	AP3 revised scheme ⁸	AP4 revised scheme ⁹	AP5 revised scheme ¹⁰		
directly affected							
Ancient Woodlands directly affected	37 ⁴²	37	37	32 ⁴³	32	14	46
Water resources and flood risk							
Major rivers diverted	7	8 ⁴⁴	8	8	8	5	13
Route through Flood Zone 3 (km)	12.0	12.0	12.0	12.0	12.0	28.5	40.5
Station/depot occupation of Flood Zone 3 (ha)	2.1	2.1	2.1	2.1	2.1	23.6	25.7
Cutting or tunnel through SPZ 1 or 2 (km)	8.1	8.1	8.1	6.7	6.7	1.7	8.4
Land use resources							
Active landfills crossed	0	0	0	0	0	5	5
Grade 1 and 2 agricultural land (km)	22.0	22.0	22.0	22.0	22.0	50.8	72.8
Waste and material resources							
Excavated material	62.2 ⁴⁵	62.4 ⁴⁵	62.6 ⁴⁵	63.4 ⁴⁵	63.4 ⁴⁶	29.00	92.4

⁴² Volume 3 of the main ES reported 19 ancient woodland sites were 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. In addition a further 11 woodland sites were identified as likely to be added to the ancient woodland inventory and therefore are assumed to be ancient.

⁴³ AP4 amendments will ensure that no loss of ancient woodland occurs at Mantle's Wood; Sibley's Coppice; Farthing's Wood; Parkhill Wood and Langley Hill Wood.

⁴⁴ The additional river diverted as a result of the AP2 revised scheme from the original scheme is Mare Brook.

⁴⁵ 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.

⁴⁶ The same figure is used for the AP5 revised scheme as was given for the AP4 revised scheme as any change in volumes is expected to be negligible given the scale of the changes.

SES₄ and AP₅ ES Volume 3 – Route-wide effects

	Phase One					Phase Two (Phase Two Manchester and Phase Two Leeds)	Overall Total (Phase One AP ₅ revised scheme and Phase Two)
	Original scheme	AP ₂ revised scheme ⁷	AP ₃ revised scheme ⁸	AP ₄ revised scheme ⁹	AP ₅ revised scheme ¹⁰		
(million m ³)							
Concrete (million tonnes)	13.62	13.04 ⁴⁷	13.04 ⁴⁸	13.04 ⁴⁹	13.04 ⁵⁰	6.77	19.81
Steel (million tonnes)	1.36	1.30 ⁴⁷	1.30 ⁴⁸	1.30 ⁴⁹	1.30 ⁵⁰	0.73	2.03

⁴⁷ This total reflects the reduced length of the AP₂ scheme as a pro-rata of the original scheme.

⁴⁸ This total reflects the reduced length of the AP₃ scheme as a pro-rata of the original scheme.

⁴⁹ This total reflects the reduced length of the AP₄ scheme as a pro-rata of the original scheme.

⁵⁰ This total reflects the reduced length of the AP₅ scheme as a pro-rata of the original scheme.

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 4 and
Additional Provision 5 Environmental Statement
Glossary of terms and list of abbreviations

December 2015

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

The terms and abbreviations contained within this document are those that can be found in the Additional Provision Environmental Statement (known as AP₁ ES), Supplementary Environmental Statement (SES), AP₂ ES, SES₂, AP₃ ES, SES₃, AP₄ ES, SES₄ and the AP₅ ES.

This document should be read in conjunction with the glossary of terms and list of abbreviations document published as part of the main ES in November 2013.

1 Glossary of terms

Term	Definition
accommodation bridge	A bridge over the route of the scheme that serves an area of land or residential property and is not considered a public highway.
Additional Provision (AP)	The High Speed Rail (London – West Midlands) Bill, deposited in Parliament on 25 November 2013, provides powers for the construction and operation of Phase One of High Speed Two (HS ₂) (the 'original scheme'). The Additional Provision covers changes which involve the acquisition or use of land outside the original limits of the Bill, additional access rights, or other extensions of the powers conferred by the Bill.
Additional Provision Environmental Statement (AP ES)	A report that describes whether and how the works associated with the Additional Provision give rise to significant environmental effects that are new or different from those already described in the main ES.
Additional Provision 2 (AP ₂)	The High Speed Rail (London – West Midlands) Bill deposited in Parliament on 25 November 2013 provides powers for the construction and operation of Phase One of High Speed Two (HS ₂) (the 'original scheme'). The Additional Provision 2 covers changes which involve the acquisition or use of land outside of the original limits of the Bill, additional access rights, or other extensions of the powers conferred by the Bill. This relates specifically to: amendments to the scheme design within community forum areas (CFAs) 4–7 and 9–26. It also relates to amendments within a number of off-route locations (i.e. locations outside a CFA), including Langley, where the Heathrow Express depot is proposed to be relocated.
Additional Provision 2 Environmental Statement (AP ₂ ES)	A set of reports that describe whether and how the works associated with the Additional Provision 2 give rise to new or different significant environmental effects to those already described in the main ES (November 2013) and the AP ES (September 2014).
Additional Provision 3 (AP ₃)	The High Speed Rail (London – West Midlands) Bill deposited in Parliament on 25 November 2013 provides powers for the construction and operation of Phase One of High Speed Two (HS ₂) (the 'original scheme'). The Additional Provision 3 covers changes which involve the acquisition or use of land outside of the original limits of the Bill, additional access rights, or other extensions of the powers conferred by the Bill. This relates specifically to amendments to the scheme design within community forum areas 1–5.
Additional Provision 3 Environmental Statement (AP ₃ ES)	A set of reports that describe whether and how the works associated with the Additional Provision 3 give rise to new or different significant environmental effects to those already described in the main ES (November 2013), the AP ₁ ES (September 2014) and the SES and the AP ₂ ES (July 2015).
Additional Provision 4 (AP ₄)	The High Speed Rail (London – West Midlands) Bill deposited in Parliament on 25 November 2013 provides powers for the construction and operation of Phase One

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

Term	Definition
	of High Speed Two (HS ₂) (the 'Proposed Scheme'). The Additional Provision 4 covers changes which involve the acquisition or use of land outside of the original limits of the Bill, additional access rights, or other extensions of the powers conferred by the Bill. This relates specifically to amendments to the scheme design within community forum areas 4–26.
Additional Provision 4 Environmental Statement (AP ₄ ES)	A set of reports that describe whether and how the works associated with the Additional Provision 4 give rise to new or different significant environmental effects to those already described in the main ES (November 2013), the AP ₁ ES (September 2014), the SES and AP ₂ ES (July 2015) and the SES ₂ and AP ₃ ES (September 2015).
Additional Provision 5 (AP ₅)	The High Speed Rail (London – West Midlands) Bill deposited in Parliament on 25 November 2013 provides powers for the construction and operation of Phase One of High Speed Two (HS ₂) (the 'Proposed Scheme'). The Additional Provision 5 covers changes which involve the acquisition or use of land outside of the original limits of the Bill, additional access rights, or other extensions of the powers conferred by the Bill. This relates specifically to amendments to the scheme design within community forum areas 6, 7, 11, 12, 15, 20, 21, 22 and 24.
Additional Provision 5 Environmental Statement (AP ₅ ES)	A set of reports that describe whether and how the works associated with the Additional Provision 5 give rise to new or different significant environmental effects to those already described in the main ES (November 2013), the AP ₁ ES (September 2014), the SES and AP ₂ ES (July 2015), the SES ₂ and AP ₃ ES (September 2015) and the SES ₃ and AP ₄ ES (October 2015).
ancillary works	Ancillary works is a generic description for site preparation works that might take place prior to work under the main construction contract. This could include: demolition, site clearance and the diversion and upgrade of utilities.
archaeological anomaly	A location identified during a geophysical survey that indicates the presence or possible presence of an archaeological feature or features.
archaeological potential	A location where the data collected and reviewed indicates that archaeological assets may be present.
assumed metapopulation	See 'metapopulation'.
attenuation tank	An attenuation tank is usually installed within a drainage system just prior to the point of discharge from a site to help control the rate of water flow during high flow conditions.
baseline	The current condition of the environment is known as the 'environmental baseline'. This is used as the basis to determine whether or not the scheme will result in significant environmental effects for each environmental topic area.
beam bridge	A beam bridge consists of structural sections spanning longitudinally between piers or abutments.
biodiversity opportunity area	Areas where conservation action, such as habitat creation, restoration or expansion, is likely to have the greatest benefit for biodiversity. They are centred on existing areas of biodiversity interest.

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

Term	Definition
bipolar anomaly	An anomaly that is composed of both a positive response and a negative response identified during a geophysical survey. It can be made up of any number of positive responses and negative responses. For example a buried pipeline consisting of alternating positive and negative anomalies is said to be bipolar.
CLoHAM (Central London Highway Assessment Model)	Transport for London's transport model for central London. The model predicts the flow and routing of traffic to allow for the assessment of the traffic impacts of/on proposed developments.
combined two-way vehicle trips	A vehicle movement that comprises an outward journey and a return journey.
Crossrail 2	A proposed new rail line linking Surrey and Hertfordshire, via tunnels under central London.
diaphragm wall	A reinforced wall that is constructed in the ground to provide structural support and retain soil for underground structures. It can also be used as a barrier to prevent the movement of groundwater through soil.
dipolar anomaly	A single positive anomaly with an associated negative response identified during a geophysical survey. There should be no separation between the two polarities of response. These responses will be created by a single feature. A very strong anomaly is likely to be caused by a ferrous object.
dive under	A dive under is an underpass that allows trains to pass beneath other tracks. This maximises the number of platforms that can be accessed from an individual track without conflicting train movements.
eDNA	eDNA, or environmental DNA, is DNA that is released into aquatic environments by plants and animals through shed skin cells, urine, faeces, saliva, hair, eggs and sperm or when they die.
eDNA survey	eDNA survey, or environmental DNA survey, is a technique used to help determine the presence or absence of species (including great crested newts) in water bodies. As eDNA can persist in water for several weeks, it can be collected and confirm if the species is present.
Euro VI engines	Engines certified to have substantially lower emissions of NO _x and particulate matter than older engines. (Euro VI as defined by EU Directive 2007/46/EC, and amended by subsequent regulations).
European Protected Species Mitigation Licence	A licence that is required from Natural England if actions from proposed works will have impacts on European protected species that would otherwise be illegal, such as: <ul style="list-style-type: none"> - capturing, killing, disturbing or injuring them (on purpose or by not taking enough care); - damaging or destroying their breeding or resting places (even accidentally); and - obstructing access to their resting or sheltering places (on purpose or by not taking enough care).
ferrous anomaly	A response obtained from geophysical survey that indicates the presence of ferrous (iron-based) material that may result from items within the topsoil or larger

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

Term	Definition
	buried objects such as pipes. Pylons or metal fences can also produce a similar response.
geophysical survey	The collection of information associated with subsurface features (e.g. buried archaeology) using various techniques (such as magnetometer – a survey technique used to detect and map changes in the earth's magnetic field caused by concentrations of ferrous-based minerals within soils and subsoil, and buried materials). They enable the identification and survey of subsurface features without having to excavate.
greenfield run-off rate	Where rainfall over impermeable or saturated ground is such that excess water flows over the ground surface to a lower lying drainage point, this is known as 'run-off'. The greenfield run-off rate is the rate of run off that would occur from a site which has not been built upon.
ground anchors	A ground anchor is a device, usually a steel tube or rod, used in both permanent and temporary applications that is driven into the ground to provide additional support to a structure (such as a retaining wall or foundation), from lateral (sideways) or vertical forces.
grouting shaft	Constructed to allow the injection of grout from horizontal tubes to control ground settlement.
high-pressure gas distribution pipeline	A local area gas network which distributes gas at greater than 7bar (unit of pressure).
high-pressure gas transmission pipeline	A national network of large diameter pipelines used to transport gas around the network at greater than 7bar. This gas is pumped at high pressure through the use of compressor stations. The gas then leaves the transmission system and enters the distribution network. Within the distribution network, the gas is then transported through a number of reducing pressure tiers to the consumer.
hyperspectral survey	A survey that utilises sensors that detect wavelengths of the electromagnetic spectrum that are not visible to the human eye. They are used in archaeological surveys to detect features within the historic landscape (e.g. field systems) that cannot be detected in visible wavelengths.
Intercity Express Programme	An initiative by the Department for Transport (DfT) to produce new trains to replace the InterCity 125 fleet on the East Coast Main Line and Great Western Main Line.
Line X	Line X is an existing dive under located on the approach to Euston station that facilitates the cross over of trains from the existing 'fast' lines on the western side of the tracks to the 'fast' platforms on the eastern side of Euston station.
main ES	This refers to the original HS ₂ Phase One Environmental Statement that was deposited along with the High Speed Rail (London – West Midlands) Bill in November 2013.
metapopulation	A group of spatially separated populations of the same species which interact at some level.

SES4 and AP5 ES Glossary of terms and list of abbreviations

Term	Definition
National Grid	A private company that owns and manages the national grid (electricity) and the national transmission system (gas) within the UK.
national grid	The high-voltage electricity transmission network in the UK.
negative anomaly	A response identified during a geophysical survey which is entirely negative in polarity. These can be caused by, for example, earthen banks where material with a lower magnetic magnitude relative to the background topsoil is built up.
on-network	Refers to the existing rail network. For example, where modifications are required to the West Coast Main Line, these are referred to as 'on-network' modifications.
original scheme	The Proposed Scheme within the main ES.
oversail	During works to overhead power lines, cranes will often be used. If part of the crane extends into the airspace above a surrounding property (e.g. the garden of a nearby dwelling), this is referred to as oversailing. Where overhead power lines overlap property or land, this is also referred to as oversailing. During normal operations in high winds, overhead power lines can sometimes be blown, such that they swing out from their normal alignment. When this covers a property, this is referred to as oversailing.
piezometric levels	The piezometric level is the level to which the water level will rise in wells penetrating an aquifer.
piled retaining wall	Constructed using long piles to allow a steeper overall slope gradient than would be naturally possible.
pipe-jacking	Pipe-jacking is a specialist tunnelling method for installing underground pipelines with the minimum surface disruption. Powerful hydraulic jacks are used to push specially designed pipes through the ground behind a shield at the same time as excavation is taking place.
polarity	Term used to describe the measurement of the magnetic response identified during a geophysical survey. An anomaly can have a positive or negative polarity.
pylon	A tall lattice-like structure (usually made of steel) which is used to support overhead power lines. Also known as an electricity transmission tower.
raking piles	Piles installed at an angle to the vertical. They are usually installed alongside regular vertical piles where additional support is required when ground conditions are likely to result in lateral (sideways) movement.
raking props	Props (posts to give support under a load) installed at an angle to laterally support the side walls of an open excavation or an internal or external wall when other support structures have been removed.
reconductoring	The process of installing or replacing conductors (i.e. wires) on a stretch of overhead power line. This will be done through the use of winches.
refurbishment (overhead line)	Replacement of some or all of the components/materials (e.g. steelwork for pylons, wires, fittings) that make up overhead lines. The refurbishment can be full

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

Term	Definition
	(i.e. replacing all of the components that make up the overhead line), or partial (e.g. replacing some fittings only).
reinstatement (overhead line)	Following a temporary diversion, overhead lines may be returned to their former position and alignment. This is known as reinstatement.
revised scheme	Aspects of the HS2 Phase One scheme outlined in the main ES that have been updated/alterd since the deposit of the hybrid Bill submitted in November 2013, and which form part of the Additional Provision.
'rolling' work site	A work site that moves over time across a geographic area as works are completed in one location to then facilitate works in an adjacent location.
Select Committee	See 'The High Speed Rail (London – West Midlands) Bill Select Committee'.
shear wall	A structural wall made up of braced panels to counter the effects of lateral (sideways) load acting on a structure.
shunting	Pushing or pulling (a train or part of a train) from the main line to a siding or from one line to another.
siding	A section of track forming a branch off the main railway line. A siding can be used to store a site direction from which they entered the siding.
stockpile	An area where materials excavated during construction of the scheme will be stored temporarily before being reused, or where construction plant and machinery associated with the scheme is stored.
Supplementary Environmental Statement (SES)	<p>The Supplementary Environmental Statement provides additional information to that provided within the main ES (November 2013). This additional information relates to:</p> <ul style="list-style-type: none"> - corrections to the main ES: deals with errors and omissions from the main ES (November 2013) that have the potential to result in new or different significant environmental effects from those reported in the main ES (November 2013); - new and updated environmental baseline information for some of the environmental topic areas (e.g. ecology), along with an assessment of whether the updated/new baseline has the potential to result in new or different environmental effects from those reported in the main ES (November 2013) and the AP₁ ES (September 2014); - changes to the scheme design that are within the limits of the Bill, but have the potential to give rise to new or different significant environmental effects from those reported within the main ES (November 2013) and the AP₁ ES (September 2014); and - updates to the traffic modelling that was used in the main ES (November 2013) and AP₁ ES (September 2014) and an assessment of whether this has the potential to give rise to new or different significant effects from those reported within the main ES (November 2013) and the AP₁ ES (September 2014).
Supplementary Environmental Statement 2 (SES ₂)	The SES ₂ reports any new or different likely significant environmental effects resulting from:

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

Term	Definition
	<ul style="list-style-type: none"> - updated/new environmental baseline information; - design changes that can be made within the Bill powers and limits of the November 2013 submission, including a revised design for Euston Station and removal of the proposed HS₁–HS₂ Link; - changes to construction assumptions from those in the main ES; and - corrections to the main ES.
Supplementary Environmental Statement 3 (SES ₃)	<p>The SES₃ reports any new or different likely significant environmental effects resulting from:</p> <ul style="list-style-type: none"> - updated/new environmental baseline information for the following environmental topics: ecology, traffic and transport and water resources and flood risk assessment; - design changes that can be made within the Bill powers and limits of the November 2013 submission; - changes to construction assumptions from those in the main ES; and - corrections to the main ES and the subsequent SESs and AP ESs.
Supplementary Environmental Statement 4 (SES ₄)	<p>The SES₄ reports any new or different likely significant environmental effects resulting from:</p> <ul style="list-style-type: none"> - design changes that can be made within the Bill powers and limits of the November 2013 submission; and - a correction to the main ES.
Technical Specifications for Interoperability	<p>Technical Specifications for Interoperability (TSI) define the technical and operational standards which must be met in order for the European railway system to allow the safe and uninterrupted movement of trains, whilst accomplishing the required levels of performance and satisfying the 'essential requirements' (safety, reliability and availability, health, environmental protection, technical compatibility and accessibility). The Technical Specifications for Interoperability are defined by EU Directive 2008/57/EC.</p>
tension piles	<p>A tension pile is installed to resist being pulled out of the ground instead of supporting a load.</p>
The High Speed Rail (London – West Midlands) Bill Select Committee ('the Select Committee')	<p>The Select Committee on the High Speed Rail (London – West Midlands) Bill was appointed by the House of Commons on 29 April 2014 after the Second Reading of the Bill on 28 April 2014.</p> <p>The committee provides individuals and bodies directly and specially affected by the Bill with the opportunity to object to the Bill's specific provisions and to seek its amendment, although not to object to the principle of the Bill.</p>
thrust bore technique	<p>A drilling method that is typically used to install piping underground. A rotary cutting head is placed inside a steel pipe and then attached to the rotation shaft of a thrust boring machine. The thrust boring machine moves forward through the ground and the piping is positioned as it progresses.</p>
trenchless techniques	<p>Typically pipelines are installed in open trenches. Where the pipeline crosses a road, river or railway this is not usually practicable and instead, trenchless techniques are used. These typically require the pipe to be pushed through the</p>

SES4 and AP5 ES Glossary of terms and list of abbreviations

Term	Definition
	ground beneath the obstacle from excavated areas in a main launch site, to what is normally a smaller reception site on the other side of the obstacle.
turbidity	A measure of the degree to which the water loses its transparency due to the presence of suspended particulates. The more total suspended solids in the water, the cloudier it appears and the higher the degree of turbidity. Turbidity is used as a measure of the quality of water.
turnback	A facility that allows a train to reverse. A turnback can be a crossover on the main railway line, or a reversing siding, which branches off the main railway line.
turning head	An area of road to allow vehicles to turn back where temporary and permanent road closures as part of the construction and operation of the scheme has created dead ends.
Up Empty Carriage Tunnel	A disused railway tunnel in the Euston area.
upgrade (overhead line)	Increasing the power flow along an overhead power line.
utility	A commodity or service, such as electricity, gas, or fuel that is provided by a public or private service provider. These are often delivered to customers via pipes, cables etc. under the ground. They can also be delivered above the ground, for example, via overhead power lines.
utility diversion	Where the current alignment of utilities, either above- or below-ground, would prevent the construction of certain components of the scheme, they may be rerouted, or the height or depth altered to facilitate construction. For example, raising the height of the existing pylons to provide clearance over the proposed HS2 route.
Water Framework Directive surveys	A survey of surface water and groundwater bodies to establish their current condition or 'status or potential' as per the Water Framework Directive (as defined by EU Directive 2000/60/EC, and amended by subsequent regulations).
Western Rail Access to Heathrow	A proposed new rail link that will connect Heathrow Terminal 5 to the Great Western main line east of Langley near Slough. The new rail link will require approximately 4km of new tunnel between Langley and Heathrow Terminal 5.
WeLHAM (West London Highway Assignment Model)	Transport for London's transport model for west London. The model predicts the flow and routing of traffic to allow for the assessment of the traffic impacts of/on proposed developments.
winches	Mechanical devices that pull in, let out or adjust the tension of wires (conductors) during erection of overhead power lines.

2 List of abbreviations, acronyms and units of measurement

Abbreviation/acronym	Meaning
AMP	assumed metapopulation
AP	Additional Provision
AP ES	Additional Provision Environmental Statement
AP ₁ ES	Additional Provision 1 Environmental Statement (previously known as the AP ES)
AP ₂	Additional Provision 2
AP ₂ ES	Additional Provision 2 Environmental Statement
AP ₃	Additional Provision 3
AP ₃ ES	Additional Provision 3 Environmental Statement
AP ₄	Additional Provision 4
AP ₄ ES	Additional Provision 4 Environmental Statement
AP ₅	Additional Provision 5
AP ₅ ES	Additional Provision 5 Environmental Statement
BOA	Biodiversity Opportunity Area
CoPA	Control of Pollution Act 1974
CRE	Contract Requirements Environment
eDNA	Environmental DNA
EPSML	European Protected Species Mitigation Licence
HEOC	Heathrow Express Operating Company
LTS	London Transportation Study
MEP	mechanical and electrical plant
MDU	maintenance delivery unit
MUGA	multi-use games area

SES₄ and AP₅ ES Glossary of terms and list of abbreviations

Abbreviation/acronym	Meaning
P/A	presence/absence
PLM	persons with limited mobility
PPMS	passengers per metre square
PFRA	Preliminary Flood Risk Assessment
PSC	population size class
SES	Supplementary Environmental Statement
SES ₂	Supplementary Environmental Statement 2
SES ₃	Supplementary Environmental Statement 3
SES ₄	Supplementary Environmental Statement 4
SBC	Slough Borough Council
SBDC	South Bucks District Council
SNRHW	stable, non-reactive hazardous waste
t	tonnes
TSI	Technical Specifications for Interoperability
UCLH	University College London Hospital
UCZ	utilities construction zone
uFMfSW	Updated Flood Map for Surface Water
WRAtH	Western Rail Access to Heathrow

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