

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 3 and
Additional Provision 4 Environmental Statement

Volume 2 | Community forum area reports

CFA5 Northolt Corridor

October 2015

SES3 and AP4 ES 3.2.1.5



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Department for Transport

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

AECOM

ARUP

ATKINS

CAPITA



ineco



**PARSONS
BRINCKERHOFF**



High Speed Two (HS2) Limited,
One Canada Square,
London
E14 5AB

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

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.gov.uk/hs2

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Structure of the HS₂ Supplementary Environmental Statement 3 and Additional Provision 4 Environmental Statement

The Supplementary Environmental Statement 3 (SES₃) and Additional Provision 4 Environmental Statement (AP₄ ES) comprises:

- Non-technical summary (NTS). This provides a summary in non-technical language of the SES₃ (Part 1) and AP₄ 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 SES₃ and AP₄ ES. This introduces the supplementary environmental information and design changes included within the SES₃ and amendments, which have resulted in the need to amend the Bill, within the AP₄ ES. It also explains any changes to the scope, methodology, assumptions and limitations required for the environmental assessment;
- Volume 2: community forum area (CFA) reports and map books. These describe the supplementary environmental information and design changes included within the SES₃ (Part 1) and amendments within the AP₄ 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 SES and SES₂ documents (and SES₃ for the AP₄ amendments) are reported. The AP₁, AP₂ and AP₃ amendments are also taken into account where relevant. In addition, the main local alternatives that have been considered are described, where relevant;
- Volume 3: route-wide effects. This reports new or different likely significant route-wide effects arising from the supplementary environmental information and design changes included within the SES₃ (Part 1) and amendments within the AP₄ ES (Part 2) compared to those reported in the main ES as updated by SES and SES₂ (and SES₃ for the AP₄ amendments). The AP₁, AP₂ and AP₃ amendments are also taken into account where relevant;
- Volume 4: off-route effects. This reports new or different likely significant off-route effects arising from the supplementary environmental information and design changes included within the SES₃ (Part 1) and amendments within the AP₄ ES (Part 2) compared to those reported in the main ES as updated by SES

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and SES₂ (and SES₃ for the AP₄ amendments). The AP₁, AP₂ and AP₃ amendments are also taken into account where relevant;

- Volume 5: appendices and map books. This contains environmental information and associated maps in support of the other volumes of the SES₃ and AP₄ 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.

Structure of this report

This volume of the SES₃ and AP₄ ES is divided into CFA reports, which are in turn divided into two parts.

Part 1 of this CFA report provides supplementary environmental information relating to:

- new baseline information with respect to ecological surveys conducted during 2015; and
- changes to the design or construction assumptions which do not require changes to the Bill.

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 SES₃ 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 of this CFA report 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 AP₄ ES assessment;
 - environmental baseline;
 - effects arising during construction;
 - effects arising from operation; and

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- 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. 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 reported the assessment of a number of amendments to the design of the original scheme in CFAs 1 – 5.
- 1.1.2 Since the submission of the main ES and subsequent SES and AP documents, updates to environmental baseline information and changes to scheme design or assumptions have occurred, which may lead to new or different significant effects. These effects, depending on the type of change, are reported in the SES3 (Part 1) or AP4 ES (Part 2) of this document, where they occur.
- 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
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
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 – 5 (i.e. this applies in the London area only)
the SES3 scheme	the SES2 scheme with the design changes described in the SES3 submitted in October 2015	4 – 26
the AP4 revised scheme	the SES3 scheme as amended by the AP4 submitted in October 2015	4 – 26

- 1.1.5 In this CFA, there is no updated environmental baseline information or changes to the scheme that have occurred within the current limits and powers of the Bill.
- 1.1.6 The AP₄ ES (Part 2 of this 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. The amendments assessed within the AP₄ ES for this CFA include:
- relocation of West Gate ventilation shaft; and
 - additional land required for the provision of the Greenford station passing loop.
- 1.1.7 The AP₄ ES (Part 2 of this report) assesses each amendment separately for all relevant topics. The purpose of the AP₄ ES is to provide an assessment of any new or different likely significant environmental effects arising from the amendments compared to the SES₃ scheme, taking into account AP₁, AP₂ and AP₃ amendments where relevant.
- 1.1.8 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 SES₃ and AP₄ ES.

Part 1: Supplementary Environmental Statement 3

2 Summary of changes

2.1 New environmental baseline information

2.1.1 There is no new environmental baseline information in the Northolt Corridor area (CFA5) which is relevant to the assessment.

2.2 Changes to the design or construction assumptions not requiring a change to the Bill

2.2.1 There are no such changes in the Northolt Corridor area (CFA5) that result in a new or different significant effect.

2.3 Topics included in the SES3 assessment

2.3.1 There are no changes described above in Sections 2.1 and 2.2 and therefore there is no requirement for a reassessment of the environmental effects or proposed mitigation as set out in the main ES, SES or SES2 for any of the environmental topics.

Part 2: Additional Provision 4 Environmental Statement

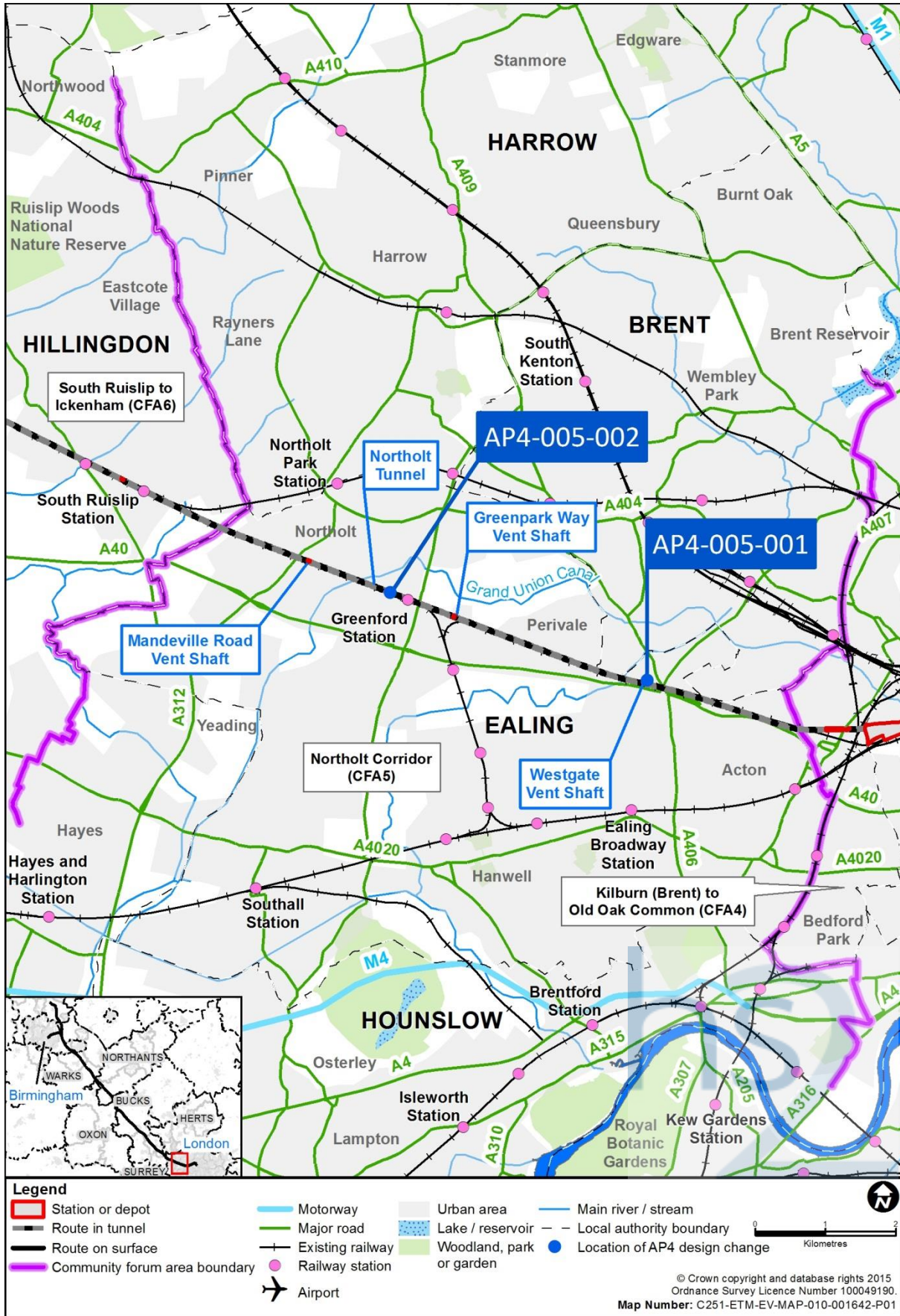
3 Summary of amendments

- 3.1.1 Table 2 provides a summary of the amendments in the Northolt Corridor CFA (CFA5) and Figure 1 shows the locations.

Table 2: Summary of amendments in CFA5

Name of amendment	Description of the SES3 scheme	Description of the AP4 revised scheme
<p>Relocation of West Gate ventilation shaft (AP4-005-001)</p>	<p>The main ES describes a ventilation and intervention shaft structure (ventilation shaft) at West Gate which will be located approximately 180m west of A4005 Hanger Lane and directly south of West Gate, within the site of an existing builder's merchant.</p>	<p>Relocation of the West Gate ventilation shaft to within an existing car park located approximately 250m further west of the location described in the main ES.</p> <p>The car park on which the ventilation shaft will be located will be replaced at a site to the north of West Gate, within the existing business park.</p> <p>This amendment requires additional land outside the existing limits of the Bill.</p>
<p>Additional land required for the provision of the Greenford Station passing loop (AP4-005-002)</p>	<p>The main ES describes the Greenpark Way ventilation shaft and the Mandeville Road ventilation shaft within CFA5. Between these locations, the proposed HS2 route passes through CFA5 in tunnel.</p> <p>No temporary or permanent above ground works were required between these two locations other than works associated with the construction of the ventilation shafts.</p>	<p>A twin track passing railway loop will be constructed adjacent to the existing Wycombe Single line (Acton & Northolt Line) to the west of Greenford station and approximately 520m west of Greenpark Way ventilation shaft, to support the movement of excavated material. The works involve the realignment of the existing single track northwards and the installation of two new sidings approximately 500m long within the existing railway area.</p> <p>This track and the new sidings are required during the construction phase for regulating excavated material trains waiting for a train path on the Great Western Main Line from West Ruislip railhead and vice versa. The new sidings will be removed prior to the HS2 operational phase.</p> <p>This amendment requires additional land outside the existing limits of the Bill.</p>

Figure 1: Locations of amendments in CFA5



4 Assessment of amendments

4.1 Relocation of West Gate ventilation shaft (AP4-005-001)

- 4.1.1 The Bill provides for a ventilation shaft at West Gate to be used for tunnel ventilation and to provide emergency intervention from surface to track level. The ventilation shaft would have been located approximately 180m west of A4005 Hanger Lane and directly south of West Gate, within the site of an existing builders merchant (refer to map CT-06-011 in the main ES, Volume 2, CFA5 Map Book). The ventilation shaft would have been rectangular, approximately 35m long by 20m wide, with a depth from road level of approximately 38m. Key features of this ventilation shaft would have included:
- a permanent fenced compound, which would have contained the following features:
 - a shaft headhouse building, which would have been approximately 44m by 17.5m and approximately 15m above existing ground level, and would have provided access to the tunnels;
 - four short connecting tunnels for ventilation and emergency access between the base of the ventilation shaft and the tunnels;
 - an area of hardstanding to the north, east and west of the headhouse building to provide access for maintenance and for the emergency services; and
 - drainage attenuation and fire protection water tanks, located under the area of hardstanding.
 - access from the A40 Western Avenue via the A4005 Hanger Lane and West Gate.
- 4.1.2 Since submission of the Bill, in order to avoid the demolition of a commercial premises and the potential loss of employment, the ventilation shaft at West Gate will be relocated approximately 250m further west of the location described in the main ES. The new location is currently used as car parking for the local businesses. Provision will be made in this amendment to reprovide the car parking permanently lost as a consequence of relocating the ventilation shaft.
- 4.1.3 Key features of the ventilation shaft will remain the same as that described in the main ES and summarised above. Materials and finishes will be subject to detailed design and agreement with the local planning authority.
- 4.1.4 The construction and operation of the ventilation shaft requires the relocation of approximately 160 car parking spaces. Approximately 25 of these on the Business Park access road will be reinstated, with the remaining 135 to be provided permanently at a site immediately north of West Gate and approximately 120m west of A4005 Hanger Lane in an area of existing car parking (refer to maps CT-05-011 and CT-06-011 in the SES3 and AP4 ES, Volume 2, CFA 5 Map Book). The new car park will be a double storey structure providing the additional car parking on the first floor and the existing car parking rearranged at ground level.

- 4.1.5 To provide sufficient area to build the shaft, land immediately west and north of the existing business park car park will be required. This land comprises of scrub, trees and ruderal vegetation and is designated as a Site of Borough Importance Grade 2 (SBI.II) with respect to ecological value. These spaces will be reinstated once the shaft construction is completed.
- 4.1.6 A temporary material stockpile will be placed on land immediately east of the River Brent. This area will be used for materials handling and storage during construction.
- 4.1.7 Construction of the West Gate ventilation shaft and new double storey car park will be managed from the relocated West Gate ventilation shaft main compound. The ventilation shaft main compound site will:
- be operational for approximately five years over a six year period. This will comprise construction of the ventilation shaft for approximately two years, starting in 2018 and including a suspension of works for approximately three months in 2020 to allow the tunnel boring machine to pass the shaft. This will be followed by a one year work suspension period after which the railway installation works and headhouse construction will commence in 2022 and continue for approximately two years and six months;
 - provide support and worker welfare facilities (but no accommodation) for up to 35 personnel each day for a period of approximately two years during the civil construction period, and for approximately five personnel for a period of approximately two years and six months during the railway installation works;
 - be used for railway installation works which will be managed from Victoria Road crossover box main compound within the Kilburn (Brent) to Old Oak Common area (CFA4); and
 - be accessed from the A40 Western Avenue via the A4005 Hanger Lane and West Gate.
- 4.1.8 Works associated with this amendment will be carried out in the following broad phases:
- site clearance and enabling works;
 - building demolition;
 - ventilation shaft construction;
 - construction of short cross passages between tunnels. This work will be carried out at depth and may include limited night working over a short period of time;
 - internal civil engineering works, including internal shafts and chambers, stair and lift core;
 - headhouse construction;
 - railway installation works comprising ventilation shaft and headhouse fit-out; and
 - landscaping and planting.

- 4.1.9 A number of utilities may require protection and/or diversion as part of the relocation of the West Gate ventilation shaft, and these have been considered as part of the AP4 assessment.
- 4.1.10 Approximately 3.3ha of additional land will be required for the ventilation shaft and the replacement car park. This additional land required is outside the existing limits of the Bill, hence the need for this amendment.
- 4.1.11 The works associated with the relocation of West Gate ventilation shaft are not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES for: agriculture, forestry and soils, air quality, community, and socio-economics. However there were changes where reassessment was considered to be required for: cultural heritage, ecology, land quality, landscape and visual assessment, sound, noise and vibration, traffic and transport, and water resources and flood risk assessment.

Cultural heritage

Introduction

- 4.1.12 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 main ES.

Scope, assumptions and limitations

- 4.1.13 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.

Existing baseline

- 4.1.14 The baseline cultural heritage information for CFA5 Northolt Corridor is described in the main ES (Volume 2, CFA5, Section 6). The cultural heritage baseline for the assessment takes into account information collected in support of the main ES, which included walk-over, remote-sensing data, and from national and local registers.
- 4.1.15 Historic Ordnance Survey maps show that the ground level was raised to form a terrace between 1920 and 1935 at the location of the ventilation shaft. The car park was built in the 1980s and the Manhattan Business Park was constructed in the early 21st century.
- 4.1.16 There are no heritage assets recorded within the location of the relocated ventilation shaft site. The relocated ventilation shaft is located to the north of the non-designated London Underground Central Line (asset reference NORo45)¹, an asset of low value, opened in 1900. This is also the historic route of the Great Western and Great Central Joint Railway (asset reference NORo44), an asset of low value.

¹ Cultural heritage assets are identified with a unique reference code, NORXXX; further detail on these assets can be found in the gazetteer in Volume 5 of the main ES: Appendix CH-002-005.

- 4.1.17 Approximately 100m to the south of the relocated ventilation shaft site is the Brent River Archaeological Priority Zone (asset reference NOR004), an asset of moderate value. The Brent River valley is an Archaeology Priority Zone because of the archaeological remains, preserved in the alluvial deposits of the River Brent.
- 4.1.18 The historic settlement of West Twyford (asset reference NOR057), an asset of low value, is located approximately 360m to the east of the relocated ventilation shaft site. The settlement is likely to have originated in the Saxon period and is recorded as a small community with a chapel in 1181. The settlement was abandoned by the 16th century.

Future baseline

Construction (2017)

- 4.1.19 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.20 None of the identified developments affect the assessment of the amendment's likely construction impacts on cultural heritage.

Operation (2026)

- 4.1.21 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.22 None of the identified developments affect the assessment of the amendment's likely construction impacts on cultural heritage.

Effects arising during construction

- 4.1.23 No significant effects were reported in the main ES as a result of physical impacts on heritage assets within the land required, temporarily and permanently, for the construction of the original scheme. There were also no temporary or permanent effects reported to the setting of heritage assets as a result of the construction of the original scheme.
- 4.1.24 The proposed relocation of the West Gate ventilation shaft will not impact upon any recorded heritage assets. As a result, the amendment will not give rise to any new or different significant construction effects and will not change the level of significance of the effects reported in the main ES.

Effects arising from operation

- 4.1.25 No significant operation effects were reported in the main ES in regard to the West Gate ventilation shaft site. The land required for the relocated ventilation shaft does not encroach on any additional heritage assets or their setting compared to the main ES.
- 4.1.26 The proposed relocation of the West Gate ventilation shaft 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.

Mitigation and residual effects

- 4.1.27 No additional mitigation measures (i.e. in addition to those identified in the main ES and subsequent SES reports) are required.
- 4.1.28 No new or different residual effects on cultural heritage occur as a consequence of the amendment. The significant residual effects of the AP₄ revised scheme in this area are therefore unchanged from those reported in the main ES.

Cumulative effects

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

Ecology

Introduction

- 4.1.30 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 main ES.

Scope, assumptions and limitations

- 4.1.31 Updates to the scope of the assessment for ecology are as set out in Volume 1 of the SES₃ and AP₄ ES. 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: CT-001-000/5).
- 4.1.32 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 AP₄ revised scheme.

Existing baseline

- 4.1.33 The ecological baseline for the land required for the amendment has been based on desk-study information and field data collected for the main ES (Volume 2, CFA₅, Section 7).
- 4.1.34 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, CFA₅, Section 7 of the main ES and in Volume 5, including maps EC-01 to EC-12 of the main ES.

Designated sites

- 4.1.35 There are three Local Wildlife Sites (LWS) relevant to the assessment, each is of district/borough value:
- Hanger (SBI.II): is located within the land required for the amendment and

consists of a canalised section of the River Brent with semi-natural habitat comprising scrub, trees and ruderal vegetation;

- River Brent west of Stonebridge SBI.II is located within the land required for the proposed amendment and includes a section of the River Brent flowing through a large open culvert with abundant scrub; and
- Central Line and Castle Bar Branch Railsides SBI.II² is located within the land required for the proposed amendment.

Habitats

- 4.1.36 The River Brent, which lies adjacent to the land required for the amendment, is heavily modified in this locality with concrete bed and sides. The land required for the amendment comprises a mosaic of scattered trees, scrub, ruderal vegetation and grassland, which is associated with the River Brent at Hanger Lane SBI.II and the Central Line and Castle Bar Branch Railsides SBI.II. These habitats are of district/borough value, as reported in the main ES (Volume 2, CFA5, Section 7).
- 4.1.37 The car park comprises hard standing, however, there are approximately 20 scattered trees (based on a review of aerial imagery) present around its perimeter, which are of local/parish value.

Protected and/or notable species

- 4.1.38 Field surveys reported in the main ES (Volume 2, CFA5, Section 7) indicate that bat assemblages of common species (common and soprano pipistrelles) and occasional noctule, *Nathusius'* and *Myotis* species are present foraging and commuting along railway land near the West Gate ventilation shaft location in low numbers. It has been assumed that non maternity roosts of common bat species may occur in structures and in nearby trees including those around the car park. Bat assemblages at this location are of local/parish value.
- 4.1.39 Breeding bird assemblages at the railway land south of the original West Gate ventilation shaft which is continuous with the land required for the amendment include 11 notable species, three red-listed bird species and eight amber-listed species. Breeding bird assemblages at this location comprise common and widespread species and are of local/parish value as reported in the main ES Volume 2, CFA5, Section 7.
- 4.1.40 Field surveys reported in the main ES (Volume 2, CFA5, Section 7) indicate low populations of common reptiles, including slow worm, were recorded in railway land south of the original West Gate ventilation shaft which is continuous with the land required for the amendment. Reptile populations in the railway land at this location are of local/parish value.
- 4.1.41 Notable terrestrial invertebrate assemblages are present along the railway land south of the original West Gate ventilation shaft location which is continuous with the land

² This site was referred to as Central Line and west Ruislip SBI.II in the main ES, but its name has been changed since production of the main ES.

required for the amendment (see the main ES Volume 2, CFA₅, Section 7). Terrestrial invertebrates are of up to district/borough value.

Future baseline

Construction (2017)

- 4.1.42 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES , SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.43 None of the identified developments affect the assessment of the amendment's likely construction impacts on ecology.

Operation (2026)

- 4.1.44 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES , SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.45 None of the identified developments affect the assessment of the amendment's likely operational impacts on ecology.

Effects arising during construction

Avoidance and mitigation measures

- 4.1.46 This assessment assumes implementation of the measures set out within the draft CoCP of the main ES, which includes translocation of protected species where applicable.

Assessment of impacts and effects

Designated sites

- 4.1.47 The land required for the amendment will result in the loss of approximately 0.4ha of habitats at the River Brent at Hanger Lane SBI.II, representing 22% of the total SBI. The loss of the land within the SBI.II will result in a new adverse effect which will be significant at the district/borough level.
- 4.1.48 The main ES reports the loss of approximately 6ha of the Central Line, West Ruislip Branch SBI.II, representing 11% of site. This is reported as a permanent adverse effect on integrity of the SBI which would be significant at the district/borough level. This SBI has been renamed since publication of the main ES and is now known as the Central Line and Castle Bar Branch Railsides SBI.II.
- 4.1.49 Land required for the amendment will result in the loss of an additional 0.3ha of Central Line and Castle Bar Branch Railsides SBI.II. The loss of the additional land within the SBI.II will not result in a different significant effect on the integrity of the site. However, the effect will remain significant at the district/borough level as reported in the main ES.
- 4.1.50 No significant impacts are expected on the River Brent west of Stonebridge SBI.II, as the only requirement is for maintenance access to the sewer system via the manhole covers, with no habitat loss.

Habitats

- 4.1.51 It has been assumed that the construction of the amendment will result in a permanent loss of approximately 23 young to semi-mature deciduous trees within the replacement car park. This is an adverse effect on the conservation status of this habitat type at the local/parish level, but is not significant.
- 4.1.52 The construction of the amendment will result in the loss of approximately 0.7ha of a mosaic of scattered trees, scrub, ruderal vegetation and grassland. This is a permanent adverse effect, which is not significant.

Protected and/or notable species

- 4.1.53 The construction of the amendment will result in a loss of habitat that could support notable terrestrial invertebrates. The temporary loss of habitat will cause some habitat fragmentation at this location. This would result in an adverse effect on these populations of terrestrial invertebrates which is significant at the district/borough level.
- 4.1.54 The construction of the amendment will result in a loss of habitat that could support common reptiles. The temporary loss of habitat will cause some habitat fragmentation at this location. Implementation of the CoCP will reduce the risk of killing/injury of reptiles. This will result in an adverse effect at the local/parish level, but is not significant.
- 4.1.55 The construction of the amendment will result in the assumed loss of non-maternity roosts of common bat species in nearby structures and trees. This includes approximately 20 semi-mature trees at the car park. The construction of the amendment will also result in a loss of a mosaic of habitat that could support foraging and commuting bats including both common and rarer species. However, there are alternative roosting opportunities, and sufficient foraging habitat remains. Access along the corridor will also be maintained. The resulting effect would be at the local/parish level, but is not significant.
- 4.1.56 The construction of the amendment will result in a loss of habitats that could support breeding birds. This will result in an adverse effect at the local/parish level, which is not significant.

Cumulative effects

- 4.1.57 The construction of the amendment will result in the loss of an additional 0.3ha of the Central Line and Castle Bar Branch Railsides SBI.II in addition to the loss of approximately 1.4ha of the Greenford station Loop amendment (which includes 1.1ha of bare ground and track see Section 4.2). This represents a total increase of 1.7ha in the land required that lies within the Central Line and Castle Bar Branch Railsides SBI.II compared with the original scheme. In combination, there will be a total habitat loss of approximately 7.7ha from the SBI. This is a different effect to that reported in the main ES, however the effect will remain significant at the district/borough level as reported in the main ES.

Mitigation and residual effects

Other mitigation measures

- 4.1.58 Mitigation for the loss of land within the River Brent at Hanger Lane SBI.II and associated impacts on habitats and species will be provided through the reinstatement of the approximately 0.4 ha of habitat affected. This will address the new significant effects on the SBI and invertebrate assemblage arising as a consequence of the amendment, and reduce these effects to a level where they are not significant.
- 4.1.59 The additional vegetated areas of the Central Line and Castle Bar Branch Railsides SBI.II affected by the amendment will be allowed to revegetate naturally, to create areas of scattered trees, scrub, ruderal vegetation and grassland habitat similar to those lost. Alongside the mitigation measures included in the main ES, this will address the different effect on the SBI arising from the amendment.

Summary of likely residual effects

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

Effects arising during operation

- 4.1.61 There are no new or different significant operation effects for ecology as a result of the amendment, in comparison with the main ES.

Land quality

Introduction

- 4.1.62 This section of the report describes the environmental baseline in relation to land quality 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 main ES.

Scope, assumptions and limitations

- 4.1.63 The assessment scope, key assumptions and limitations for land quality 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

- 4.1.64 The baseline land quality information for CFA5 Northolt Corridor is described in the main ES (Volume 2, CFA5, Section 8).
- 4.1.65 The construction of the ventilation shaft is expected to extend approximately 38m below ground level and will therefore be confined within the London Clay Formation. The proposed work site currently comprises a section of soft landscaping in the west and is overlain by hardstanding (largely tarmac) elsewhere.
- 4.1.66 In addition, a summary of the baseline conceptual site model (CSM) for areas associated with the AP4 revised scheme is provided in Table 3.

Table 3: Summary of baseline CSM for sites which may pose a contaminative risk for the AP₄ revised scheme

Area reference ³	Area name and classification	Main potential impacts	Main baseline risk ⁴
AP ₄ -5-001	Former railway land overlying the London Clay Formation at the West Gate ventilation shaft site (Map LQ-01-006 of the Main ES)	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated shallow perched/groundwater.	Moderate/low
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate/low
		Lateral and vertical migration of mobile contamination into the River Brent.	Low
		Lateral and vertical migration of mobile contamination into the River Terrace Deposits.	Low
AP ₄ -5-104	On-site business park and car park located at the West Gate ventilation shaft site (Map LQ-01-006 of the Main ES)	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated shallow perched/groundwater.	Moderate/low
		Lateral and vertical migration of mobile contamination into the River Brent.	Low
		Lateral and vertical migration of mobile contamination into the River Terrace Deposits.	Low

Future baseline

Construction (2017)

- 4.1.67 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.68 None of the identified developments affect the assessment of the amendment's likely construction impacts on land quality.

³ Each area is assigned a unique identification number.

⁴ The moderate or high risks identified reflect the uncertainty in existing baseline information. Whilst there are unlikely to be properties or receptors that experience the reported high or moderate existing baseline risk in the absence of site investigation, a precautionary, worst-case risk is reported in the table.

4.1.69 The potential for the baseline to change in the lead up to the construction of the amendment is limited to the extent to which any new development necessitates remediation or mitigation measures to control potential contamination releases. Any new development in the study area on potentially contaminated land will need to be suitable for its intended use, as set out in the National Planning Policy Framework (NPPF). To meet this requirement, new development sites may require remediation to be undertaken. This will mean that some areas described as having potentially contaminative current and/or historical land use, may no longer be of significance at the time of construction.

Operation (2026)

4.1.70 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.

4.1.71 None of the identified developments affect the assessment of the amendment’s likely operational impacts on land quality.

Effects arising during construction

4.1.72 Table 4 presents a summary of the construction effects obtained from a comparison of the baseline and construction impacts. The construction risk assessment takes into account the implementation of the mitigation measures set out within the draft CoCP.

Table 4: Summary of temporary (construction) effects

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
AP ₄ -5-001	Former railway land overlying the London Clay Formation at the West Gate ventilation shaft site (Map LQ-01-006 of the main ES)	<p>Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters = Moderate/low.</p> <p>Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases = Moderate/low.</p> <p>Potential impact from lateral vertical migration of contamination into the River Brent = Low.</p> <p>Potential lateral and vertical migration of mobile contamination into the River Terrace Deposits = Low.</p>	<p>Pathway not present⁵</p> <p>Pathway not present</p> <p>Low</p> <p>Low</p>	Negligible (not significant)

⁵ The implementation of the CoCP means that the risk of human exposure to potential contamination during construction will be mitigated and controlled.

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Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
AP ₄ -4-119, AP ₄ -4-10, AP ₄ -4-001	On-site business park and car park located at the West Gate ventilation shaft site (Map LQ-01-006 of the main ES)	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters = Low to mod/low. Potential impact from lateral vertical migration of contamination into the River Brent = Low. Potential impact from lateral vertical migration of contamination into the River Terrace Deposits = Low.	Pathway not present Low Low	Negligible (not significant)

- 4.1.73 In summary, the ventilation shaft is expected to extend approximately 38m below ground level which is confined within the London Clay Formation. The low permeability nature of the London Clay effectively acts as a barrier to the downward migration of any contamination and is expected to offer protection to the underlying aquifers.
- 4.1.74 The main potential risks identified are associated with human health on-site, where current and historical potentially contaminating activities are affected by the amendment. It is expected that the measures adopted within the CoCP will ensure that risks to human health will not be increased over baseline conditions, and in some instances may improve during construction as any remediation required by the CoCP is undertaken. The risks are not considered to be significant.
- 4.1.75 Risks to shallow groundwater quality in the River Terrace Deposits from piling or ventilation shaft construction works will be managed in accordance with the draft CoCP and good practice, including the Environment Agency guidance on piling and penetrative ground improvement. It is therefore also expected that there will be a negligible effect on the groundwater quality within the River Terrace Deposits during construction⁶.
- 4.1.76 The ventilation shaft site compound may include maintenance facilities for plant equipment and machinery and fuel storage in bunded tanks. As such, the use and storage of potentially contaminative materials such as fuels, oils and solvents may occur. The ventilation shaft site may also be used for temporary storage of potentially contaminated soils. The measures outlined in the draft CoCP will manage risks from the storage of such materials particularly with respect to the adjacent River Brent watercourse.
- 4.1.77 No significant construction effects on land quality relating to the works at West Gate ventilation shaft were reported in the main ES. Relocation of the West Gate

⁶ Environment Agency (2001), Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention, National Groundwater and Contaminated Land Centre, Project NC/99/73, Solihull.

ventilation shaft will not give rise to any new significant land quality effects during construction.

Effects arising from operation

- 4.1.78 No significant operation effects were reported in the main ES in regard to the West Gate ventilation shaft site.
- 4.1.79 The proposed relocation of the West Gate ventilation shaft 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.

Mitigation and residual effects

- 4.1.80 The risk assessment for the post-construction stage will include measures that will be adopted in the draft CoCP to remove, treat or isolate contamination. Further measures could also include the construction of permanent embedded design features in buildings/ventilation shaft, such as gas protection measures (e.g. ventilation of confined spaces or inclusion of gas resistant membranes in basement or floor slabs). Overall risks for future site maintenance users from pre-existing contamination sources will be low to very low and are therefore not significant.
- 4.1.81 It is considered unlikely that additional remediation works will be required over and above the mitigation measures contained as standard within the draft CoCP.
- 4.1.82 There may be ongoing monitoring requirements, including monitoring of groundwater quality or ground gas, following any remediation works carried out during construction. The purpose of the monitoring would be to identify whether there is any requirement for additional remediation measures.
- 4.1.83 No additional mitigation measures (i.e. in addition to those identified in the main ES and subsequent SES reports) are required.
- 4.1.84 No new or different residual effects on land quality occur as a consequence of the amendment. The significant residual effects of the AP₄ revised scheme in this area are therefore unchanged from those reported in the main ES.

Cumulative effects

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

Landscape and visual assessment

Introduction

- 4.1.86 This section of the report describes the environmental baseline in relation to the landscape and visual assessment. It then identifies any new or different likely significant environmental effects as a result of the amendment, compared to those of the main ES.

Scope, assumptions and limitations

- 4.1.87 The assessment scope, key assumptions and limitations for landscape and visual 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. An update to the methodology for the landscape and visual assessment is also described in Volume 1 of the AP₁ ES.

Existing baseline

- 4.1.88 The baseline landscape and visual information for CFA₅ Northolt Corridor is described in the main ES (Volume 2, CFA₅, Section 9).
- 4.1.89 The area of land required for the amendment is located within Alperton Industrial Landscape Character Area (LCA) as described in the main ES (Appendix LV-001-005).
- 4.1.90 The following viewpoints are located in close proximity to the amendment and are described in the main ES (Volume 5: Appendix LV-001-005):
- Viewpoint 025.2.004: view north from residential properties on Western Avenue including Fairfax, Wellington, Frobisher, Gordon and Nelson Houses, from residential properties on Brunswick Road and from Western Avenue (A40);
 - Viewpoint 025.3.005: view north-east from residential properties on Lynwood Road and Western Avenue (A40) and from a Public Right of Way (PRoW) (Footpath 37);
 - Viewpoint 026.6.001: view south from AGB House, West Gate; and
 - Viewpoint 026.6.002: view east from commercial units and offices on West Gate.

Future baseline

Construction (2017)

- 4.1.91 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.92 None of the identified developments will affect the assessment of the SES₃ scheme's likely construction impacts on landscape character and visual amenity.

Operation (2026)

4.1.93 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.

4.1.94 None of the identified developments will affect the assessment of the SES₃ scheme's likely operational impacts on landscape character and visual amenity.

Effects arising during construction

Landscape assessment

4.1.95 The Alperton Industrial LCA was assessed as being affected by the original scheme and will be affected by this amendment. The Alperton Industrial LCA is characterised by the presence of large-scale industrial and commercial steel clad warehouses and sheds, mostly surrounded by extensive hardstanding, used for parking and storage of materials. There is little vegetation in the area, apart from hedgerows and mature trees on the boundaries of the industrial estates. Due to the fair condition, low tranquillity and limited landscape value, this character area has a low sensitivity to change. The main ES reported a minor adverse non-significant effect during construction due to barely perceptible change to the local character of this LCA due to demolition of the builder's warehouse and construction of the new headhouse at the West Gate ventilation shaft site.

4.1.96 The amendment will relocate the ventilation shaft 230m west of its location in the original scheme, to an existing car park and a new double storey car park will be constructed to the north of the former ventilation shaft location. An area of grass and scrub vegetation (approximately 0.7ha) will be removed to accommodate the main compound and temporary material stockpile. Construction of the ventilation shaft and car park will take place within the same industrial and commercial area as in the original scheme. The effects will be contained by the surrounding buildings and will affect a small proportion of the character area.

4.1.97 The amendment will not give rise to a new or different effect with the relocation of the construction works for the ventilation shaft and the additional construction works for the car park and will not change the level of significance of the effects reported in the main ES.

Visual assessment

4.1.98 Viewpoint 025.2.004: view north from residential properties on Western Avenue including Fairfax, Wellington, Frobisher, Gordon and Nelson Houses, from residential properties on Brunswick Road and from Western Avenue (A40) was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a minor adverse non-significant effect during construction due to the construction activity being largely characteristic of the existing view.

4.1.99 The amendment will not generate any new or different significant effects. The nature of the construction works on the ventilation shaft will be the same as assessed in the original scheme and the works on the double storey car park, will continue to be viewed in the context of the existing industrial and commercial estate. Longer views from residential receptors south of the existing railway corridor and Western Avenue

will continue to be filtered and screened by intervening vegetation and buildings. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.

- 4.1.100 Viewpoint 025.3.005: view north-east from residential properties on Lynwood Road and Western Avenue (A40) and from a PRoW (Footpath 37) was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a minor adverse non-significant effect during construction due to the construction activity being largely characteristic of the existing view.
- 4.1.101 The amendment will not generate any new or different significant effects. The nature of the construction works on the ventilation shaft will be the same as assessed in the original scheme, and the works on the double storey car park will continue to be viewed in the context of the existing industrial and commercial estate. Longer views from residential receptors south of the existing railway corridor and Western Avenue will continue to be filtered and screened by intervening vegetation and buildings. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.
- 4.1.102 Viewpoint 026.6.001: view south from AGB House, West Gate, was assessed as being affected by the original scheme, and will also be affected by this amendment. The main ES reported a minor adverse non-significant effect during construction due to the construction activity being largely characteristic of the existing view.
- 4.1.103 The amendment will not generate any new or different significant effects. The nature of the construction works on the ventilation shaft will be the same as assessed in the original scheme, and the works on the double storey car park will continue to be viewed in the context of the existing industrial and commercial estate. Longer views from residential receptors south of the existing railway corridor and Western Avenue will continue to be filtered and screened by intervening vegetation and buildings. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.
- 4.1.104 Viewpoint 026.6.002: view east from commercial units and offices on West Gate was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a minor adverse non-significant effect during construction due to the construction activity being largely characteristic of the existing view.
- 4.1.105 The amendment will not generate any new or different significant effects. The nature of the construction works on the ventilation shaft will be the same as assessed in the original scheme, and the works on the double storey car park will continue to be viewed in the context of the existing industrial and commercial estate. Longer views from residential receptors south of the existing railway corridor and Western Avenue will continue to be filtered and screened by intervening vegetation and buildings. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.

Effects arising from operation

Landscape assessment

- 4.1.106 The Alperton Industrial LCA was assessed as being affected by the original scheme and will be affected by this amendment. The Alperton Industrial LCA is characterised by the presence of large scale industrial and commercial steel clad warehouses and sheds, mostly surrounded by extensive hardstanding, used for parking and storage of materials. There is little vegetation in the area, apart from hedgerows and mature trees on the boundaries of the industrial estates. Due to the fair condition, low tranquillity and limited landscape value this character area has a low sensitivity to change. The main ES reported a negligible non-significant effect during operation year 1, due to a barely perceptible change to the local character of the LCA resulting from the presence of the headhouse, remaining negligible in years 15 and 60.
- 4.1.107 In the amendment, the ventilation shaft and new double storey car park will be located within the same industrial and commercial estate as assessed in the original scheme. The grass and scrub vegetation removed for the main compound and temporary material stockpile will be replanted. The new structures will be surrounded by buildings of a similar size and architectural quality and consequently, as in the main ES, their presence will result in only a barely perceptible change to the local character of the LCA. The amendment will not give rise to a new or different significant effect, with the relocation of the ventilation shaft and the introduction of the car park into the landscape in year 1, 15 or 60 and will not change the level of significance of the effects reported in the main ES.

Visual assessment

- 4.1.108 Viewpoint 025.2.004: view north from residential properties on Western Avenue including Fairfax, Wellington, Frobisher, Gordon and Nelson Houses, from residential properties on Brunswick Road and from Western Avenue (A40) was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a negligible non-significant effect during operation year 1, due to addition of new components that are largely inconspicuous and characteristic of the existing, remaining negligible in years 15 and 60.
- 4.1.109 The amendment will not generate any new or different significant effects. The headhouse will be of the same appearance and scale as the original scheme, and it will be viewed in the context of the existing industrial and commercial estate, where it will be surrounded by utilitarian buildings. The double storey car park will be closely surrounded by buildings of a similar scale and largely screened. The amendment will introduce new features into these views, but they will be characteristic of the existing views. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.
- 4.1.110 Viewpoint 025.3.005: view north-east from residential properties on Lynwood Road and Western Avenue (A40) and from a PRoW (Footpath 37) was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a negligible non-significant effect during operation year 1 due to addition of new components that are largely inconspicuous and characteristic of the existing, remaining negligible in years 15 and 60.

- 4.1.111 The headhouse will be of the same appearance as the one assessed in the original scheme and it will continue to be viewed in the context of the existing industrial and commercial estate, where it will be surrounded by utilitarian buildings. The amendment will bring the headhouse closer to some properties and further from others represented by this viewpoint. The double storey car park will be closely surrounded by buildings of a similar scale. The amendment will introduce new features into these views, but they will be characteristic of the existing views. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.
- 4.1.112 Viewpoint 026.6.001: view south from AGB House, West Gate was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a negligible non-significant effect during operation year 1 due to addition of new components that are largely inconspicuous and characteristic of the existing, remaining negligible in years 15 and 60.
- 4.1.113 The amendment will not generate any new or different significant effects. The ventilation shaft will be of the same appearance as the one assessed in the original scheme, and it will continue to be viewed in the context of the existing industrial and commercial estate. The double storey car park will be closely surrounded by buildings of a similar scale. The amendment will introduce new features into these views, but they will be characteristic of the existing views. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.
- 4.1.114 Viewpoint 026.6.002: view east from commercial units and offices on West Gate was assessed as being affected by the original scheme and will also be affected by this amendment. The main ES reported a negligible non-significant effect during operation year 1, due to addition of new components that are largely inconspicuous and characteristic of the existing, remaining negligible in years 15 and 60.
- 4.1.115 The amendment will not generate any new or different significant effects. The ventilation shaft will be of the same appearance as the one assessed in the original scheme and it will continue to be viewed in the context of the existing industrial and commercial estate. The double storey car park will be closely surrounded by buildings of a similar scale. The amendment will introduce new features into these views, but they will be characteristic of the existing views. Therefore, the amendment will not give rise to any new or different effect and will not change the level of significance of the effects reported in the main ES.

Mitigation and residual effects

- 4.1.116 No additional mitigation measures in addition to those identified in the main ES are required.
- 4.1.117 No new residual effects on landscape and visual amenity occur as a consequence of the amendment. The significant residual effects of the AP₄ revised scheme in this area are therefore unchanged from those reported in the main ES.

Cumulative effects

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

Sound, noise and vibration

- 4.1.119 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 main ES.

Scope, assumptions and limitations

- 4.1.120 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.
- 4.1.121 Local assumptions and limitations for sound, noise and vibration are set out in main ES Volume 2, CFA₅, Section 11.

Existing baseline

- 4.1.122 The baseline sound, noise and vibration information for CFA₅ is described in the main ES (Volume 2, CFA₅, Section 11.2). Baseline sound levels representative of the assessment locations affected by this amendment have been used in the construction sound, noise and vibration assessments. No additional assessment locations were required to undertake the construction sound, noise and vibration assessment.

Future baseline

Construction (2017 and 2021)

- 4.1.123 The future baseline for construction in 2017, and construction traffic in 2021, remains unchanged from that reported in the main ES (Volume 2, CFA₅, Section 11.2).
- 4.1.124 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ 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 SES₂ and AP₃ ES.
- 4.1.125 None of the identified developments affect the assessment of the AP₄ revised scheme's likely construction noise and vibration impacts.

Operation (2026)

- 4.1.126 The future baseline for operation in 2026 remains unchanged from that reported in the main ES (Volume 2, CFA₅, Section 11.2).
- 4.1.127 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.128 None of the identified developments affect the assessment of the AP₄ revised scheme's likely operational noise and vibration impacts.

Effects arising during construction

- 4.1.129 The closest noise-sensitive receptors to the amendment are non-residential buildings, located approximately 50m to the east of the amendment and residential properties located approximately 100m to the south of the amendment.
- 4.1.130 In the main ES, there were no dwellings or buildings at which noise from construction of the West Gate ventilation shaft was forecast to be higher than the noise insulation trigger levels as defined in the draft CoCP.
- 4.1.131 The main ES also reported there to be no likely significant effects (assessed on a community basis) from construction noise at residential communities surrounding the West Gate ventilation shaft.
- 4.1.132 Temporary significant construction noise effects that were identified in the main ES on a reasonable worst-case basis at the following non-residential receptors are no longer likely:
- Westgate House, West Gate, London W5 1UA (CSV05-No1⁷, represented by assessment location 700420, see main ES, Volume 5: Sound, noise and vibration map book, SV-03 maps);
 - Westgate Media and Broadcast Ltd, West Gate, London W5 1UA (CSV05-No2, assessment location 700420);
 - AGB House West Gate, London W5 1EL (CSV05-No3, assessment location 700420);
 - Commercial operations in Westworld, West Gate, London W5 1EL (CSV05-No4, assessment location 494242); and
 - Manhattan House, Manhattan Business Park (CSV05-No5, assessment location 494242).
- 4.1.133 These effects are no longer considered likely due to the relocation of the ventilation shaft resulting in a greater distance between the construction activities and the identified receptors.
- 4.1.134 An assessment has been undertaken to determine whether construction noise and vibration associated with the amendment would result in a likely significant effects, using the significance criteria detailed in the main ES (Volume 5: Appendix SV-001-000).
- 4.1.135 The proposed relocation of the West Gate ventilation shaft will not give rise to a new significant effect on sound, noise and vibration during construction and will not change the level of significance of the effects reported in the main ES, SES or SES₂.
- 4.1.136 The predicted construction sound levels as a result of this amendment are presented in the SES₃ and AP₄ ES Volume 5: Appendix SV-003-005.

⁷ Construction related significant noise effects on non-residential receptors are identified with a unique identification number, CSVXX-NXX. Further detail on these effects can be found in Volume 5, Appendix SV-003-005 of the main ES.

Effects arising from operation

- 4.1.137 Significant noise effects from the operational static sources such as mechanical ventilation at ventilation shafts will be avoided through their design and the specification of noise emission requirements as described in the main ES Volume 5: Appendix SV-001-000.
- 4.1.138 The proposed relocation of the West Gate ventilation shaft 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.

Mitigation and residual effects

- 4.1.139 The assessment of construction noise and vibration assumes the implementation of the principles and management processes set out in the draft CoCP (Volume 5: Appendix CT-003-000).
- 4.1.140 No additional mitigation is considered necessary as a result of the proposed amendment.
- 4.1.141 The following significant residual construction noise effects at non-residential receptors identified in the main ES are no longer considered likely as a result of the amendment:
- West Gate House;
 - West Gate Media and Broadcast Ltd;
 - AGB House;
 - commercial operations in Westworld West Gate; and
 - Manhattan House.
- 4.1.142 There are no further changes to the significant residual construction noise or vibration effects identified in the main ES as a consequence of the amendment.

Cumulative effects

- 4.1.143 This assessment has considered the potential cumulative construction noise effects of the scheme and other committed developments.
- 4.1.144 There are no new or different likely significant cumulative effects for sound, noise and vibration as a result of the AP4 amendments interacting with one another, the AP2 amendments or any relevant committed development.

Traffic and transport

Introduction

- 4.1.145 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 main ES taking account of any relevant AP2 amendments.

Scope, assumptions and limitations

- 4.1.146 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

- 4.1.147 The baseline traffic and transport information for CFA5 Northolt Corridor is as described in the main ES (Volume 2, CFA5 Report, Section 12) and the SES and AP2 ES.

Future baseline

Construction

- 4.1.148 The future baseline for construction is as described in the main ES, Volume 2, CFA5, Section 12 and the SES and AP2 ES, Volume 2, CFA5.

Operation (2026 and 2041)

- 4.1.149 The future baselines for operation are as described in the main ES, Volume 2, CFA5, Section 12 and the SES and AP2 ES, Volume 2, CFA5.

Effects arising during construction

- 4.1.150 Relocation of the ventilation shaft will result in the temporary loss of approximately 25 car parking spaces from the West Gate access road for a period of three years during construction.
- 4.1.151 Replacement parking will be provided at a site to the north of West Gate to accommodate the temporary loss of parking spaces together with the permanent loss, as discussed under 'Effects during operation'.
- 4.1.152 As a result of the additional walk distance to the relocated parking, this will result in new temporary major adverse significant effect for users of West Gate access road.

Effects arising during operation

- 4.1.153 Relocation of the ventilation shaft will also result in permanent loss of parking spaces at:
- the West Gate Hanger Lane Ltd car park (approximately 109 car parking spaces); and
 - the Manhattan Business Park Management Co. Ltd overflow car park (approximately 26 car parking spaces).
- 4.1.154 The replacement parking to be provided at the site to the north of West Gate will accommodate this permanent loss of parking.
- 4.1.155 The replacement parking for Westgate Hanger Lane Ltd is expected to reduce the travel distance to the car park for the majority of users and result in no new or different significant effect. However, the additional walk distance to the relocated parking for users of the Manhattan Business Park Management Co. Ltd overflow car park will result in a new moderate adverse significant effect.

Mitigation and residual effects

- 4.1.156 The amendment includes the provision of replacement parking, which will accommodate all the lost parking spaces and, following the completion of construction, the 25 spaces at the West Gate access road will be reinstated.
- 4.1.157 No additional mitigation measures, in addition to those identified in the main ES and subsequent SES and AP₂ ES are proposed.
- 4.1.158 There is one new adverse significant residual effect during construction and one permanent adverse significant residual effect due to the distance from the existing parking to the relocated parking.
- 4.1.159 The significant traffic and transport effects that result from construction of the amendment are shown on map TR-03-006 in the SES₃ and AP₄ ES Volume 5, Traffic and Transport Map Book.

Cumulative effects

- 4.1.160 The above 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 neighbouring areas.
- 4.1.161 There are no new or different likely significant cumulative effects for traffic and transport as a result of AP₄ amendments interacting with one another or AP₂ amendments.

Water resources and flood risk

Introduction

- 4.1.162 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 SES₃ scheme.

Scope, assumptions and limitations

- 4.1.163 The assessment scope, key assumptions and limitations for water resources and flood risk 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

- 4.1.164 The baseline water resources and flood risk information for CFA₅ Northolt Corridor is described in the main ES (Volume 2, CFA₅ Report: Section 13).
- 4.1.165 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, CFA₅ Report: Section 13.3 and in Volume 5 Appendix WR-002-005.
- 4.1.166 Table 5 includes surface water features potentially affected by the design changes.

SES₃ and AP₄ ES Volume 2 – CFA 5, Northolt Corridor

Table 5: Surface water features potentially affected by the design changes

Water feature	Location description (and map reference as set out in Main ES Volume 5 Water resources Map Book)	Watercourse classification ⁸	WFD water body and current overall status	WFD status objective (by 2027* as per River Basin Management Plan ⁹)	Receptor value ¹⁰
River Brent	The proposed site is located adjacent to the east bank of the river within the Manhattan Business Park. SWC-CFA5-01 (WR-01-005 - E6)	Main River.	River Brent (below Silk Stream and down to the River Thames) (GB106039023590) Poor potential	Good potential	High

- 4.1.167 The assessment has taken account of changes in relevant legislation since the main ES was produced, such as the Water Act 2014 and the Environmental Permitting (England and Wales) Regulations amendment 2014.
- 4.1.168 The principal geology underlying the revised scheme, as mapped by the British Geological Survey, is the London Clay Formation (part of the Thames Group). The Thames Group is classified as Unproductive strata.
- 4.1.169 The London Clay Formation is overlain by superficial deposits comprising the Taplow Gravel Formation. Alluvium overlies the London Clay Formation to the north west of the site on the opposite bank of the River Brent. Both the Taplow Gravel Formation and the Alluvium are classified as Secondary A aquifers by the Environment Agency.
- 4.1.170 Further details regarding the geology can be found in Volume 2, Appendix WR-002-005 of the main ES.
- 4.1.171 The Environment Agency reports that there are three licensed groundwater abstractions (GW54, GW55 and GW56) within 200m of the site. All three sources abstract water from the Chalk aquifer which underlies the Thames Group.
- 4.1.172 The revised location for the ventilation shaft is closer to the River Brent, with works taking place within approximately 15m of the top of the bank of the watercourse. However, according to the updated Flood Map for Surface Water, neither the revised ventilation shaft location nor associated works areas lie within the 1 in 1000 year return period (0.1% annual probability) flood outline.
- 4.1.173 Neither the original nor revised location of the ventilation shaft lies within an area at risk of flooding from surface water, groundwater, sewers or artificial waterbodies.

⁸ 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 Defra on the main river map and are regulated by the Environment Agency.

⁹ Environment Agency (2009) River Basin Management Plan, Thames River Basin District.

¹⁰ For examples of receptor value see Table 43 in the SMR Addendum (see Volume 5, Appendix CT-001-000/2).

Future baseline

Construction (2017)

- 4.1.174 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.175 None of the identified developments affect the assessment of the amendment's likely construction impacts on water resources and flood risk.
- 4.1.176 Information on the potential additional impacts of climate change for water resources and flood risk is provided in Volume 5 Appendix WR-003-006 of the main ES, and Sections 7 and 8 of Volume 1 and Table 13 of Volume 5: Appendix CT-009-000.

Operation (2026)

- 4.1.177 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.1.178 None of the identified developments affect the assessment of the amendment's likely construction impacts on water resources and flood risk.
- 4.1.179 Current projections to the 2080s indicate that climate change may affect the future baseline against which the impacts of the AP₄ revised scheme on surface water and groundwater resources have been assessed. There may be changes in the flow and water quality characteristics of surface water and groundwater bodies as a result of changes in climate. However, these changes are not considered to result in changes to the level of significance of the effects reported in the main ES.
- 4.1.180 Further information on the potential additional impacts of climate change for water resources and flood risk is provided in Sections 7 and 8 of Volume 1 and Table 13 of Volume 5: Appendix CT-009-000 of the main ES.

Effects arising during construction

- 4.1.181 The new ventilation shaft location will be founded in the London Clay Formation. Due to the low permeability of the London Clay Formation there is no pathway for impacts on groundwater in the underlying Chalk aquifer or on licensed abstractions GW₅₄, GW₅₅ and GW₅₆.
- 4.1.182 The West Gate ventilation shaft is located in an area underlain by the Taplow Gravel Formation. There is a potential that excavation of the ventilation shaft and installation of a retention wall adjacent to the River Brent could impact on the groundwater levels and flow within the superficial deposits. The ventilation shaft has the potential to intercept groundwater flow toward the River Brent from the east, and cause a slight mounding of groundwater up gradient of the ventilation shaft. Recharge to the Taplow Gravel Formation is likely to be limited since the predominant land cover is impermeable. In addition groundwater flow will divert around the ventilation shaft, and impacts on flow will be highly localised. Overall it is assessed that the impact on groundwater flow on this moderate value receptor will be minor adverse, with slight effect and therefore is not significant.

- 4.1.183 Shaft and retaining wall construction could have the potential to impact on groundwater quality in the Taplow Gravel Formation. Impacts on water quality could result from the migration of fluids or suspended bedrock particles into the formation giving rise to raised turbidity or contamination of the groundwater. Application of the mitigation measures set out in the draft CoCP including Section 16 will protect the aquifer. Therefore, it is assessed that impacts will be negligible with neutral effect and therefore not significant.
- 4.1.184 The shallow superficial Taplow Gravel Formation aquifer may potentially be in hydraulic continuity with the surface water in the River Brent. There is potential for construction activity in the aquifer to have a consequential impact on surface water quality in the River Brent. Migration of turbid groundwater to surface water will be limited by the natural filtering effect of the gravel aquifer and therefore is unlikely to significantly affect surface water quality. With the implementation of Sections 12 and 16 of the draft CoCP (see Volume 5: Appendix CT-003-000 of the main ES) and best practice, there will be sufficient mitigation in place to avoid adversely impacting surface water quality through construction activities.
- 4.1.185 The amendment is not anticipated to result in any changes to the treatment of collected runoff from the south of the HS₂ route, in comparison with the original scheme. The revised location of the ventilation shaft does not lie within an area at significant risk of flooding from any source. As a result, the amendment does not result in any new or different temporary or permanent significant effects on flood risk in comparison with the original scheme or the subsequent revisions.
- 4.1.186 The proposed relocation of the West Gate ventilation shaft 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, SES, SES₂, or SES₃.

Effects arising from operation

- 4.1.187 No significant operation effects were reported in the main ES in regard to the West Gate ventilation shaft site.
- 4.1.188 The proposed relocation of the West Gate ventilation shaft 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, SES, SES₂, or SES₃.

Mitigation and residual effects

- 4.1.189 The draft CoCP sets out the measures and standards of work that will be applied to the construction of the AP₄ revised scheme (see the main ES, Volume 5, Appendix CT-003-000). These will provide effective management and control of the impacts during the construction period. The general approach to mitigation to be applied across the entire AP₄ revised scheme, including this amendment, is set out in Volume 1, Section 9 of the main ES.
- 4.1.190 Generic design measures will be implemented to avoid significant adverse effects on the quality and flow characteristics of surface watercourses and groundwater bodies during operation of the AP₄ revised scheme. These are described in Volume 1, Section 9 of the main ES, and in the draft operation and maintenance plan for water resources and flood risk included in Volume 5: Appendix WR-001-000.

- 4.1.191 No additional mitigation measures (i.e. in addition to those identified in the main ES and subsequent SES reports) are required.
- 4.1.192 No new or different residual effects on water resources and flood risk assessment occur as a consequence of the amendment.

Cumulative effects

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

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

- 4.1.194 The amendment to relocate West Gate ventilation shaft will give rise to new and different significant effects with regard to, sound, noise and vibration and traffic and transport.
- 4.1.195 Temporary significant construction noise effects that were identified in the main ES on a reasonable worst-case basis, at a number of non-residential receptors are no longer likely.
- 4.1.196 There is one new adverse significant residual effect during construction for users of West Gate access road parking and one permanent adverse significant residual effect for users of the Manhattan Business Park Management Co. Ltd overflow car park due to the distance from the existing parking to the relocated parking.

4.2 Additional land required for the provision of the Greenford Station passing loop (AP₄-005-002)

- 4.2.1 The Bill provides for HS₂ to pass through CFA₅ in tunnel, between the Greenpark Way ventilation shaft and the Mandeville Road ventilation shaft. No temporary or permanent above ground works were required between these two locations other than works associated with the construction of the ventilation shafts (refer to maps CT-05-013 and CT-05-014 in main ES Volume 2, CFA₅ Map Book.)
- 4.2.2 Since the submission of the Bill, capacity along the Wycombe Single line (Acton to Northolt Line) has been reviewed and the need to install a twin track passing railway loop adjacent to the line has been identified. The loop would be installed to the west of Greenford London Underground Central Line station, and approximately 520m west of Greenpark Way ventilation shaft, to support movement of excavated material (refer to maps CT-05-013 and CT-05-014 in SES₃ and AP₄ ES Volume 2, CFA₅ Map Book). The works involve the realignment of the existing single track northwards and the installation of two new sidings approximately 500m long within the existing railway area.
- 4.2.3 Approximately 1.3ha of additional land will be required temporarily for this amendment. The additional land required is outside the existing limits of the Bill, hence the need for this amendment.
- 4.2.4 The track and the new sidings are required from an early stage during the construction phase for regulating trains carrying excavated material. The passing loop will provide

capacity to move trains up and down the Wycombe Single line by providing a holding point for trains until a train path becomes available to go on the Great Western Main Line from West Ruislip railhead and vice versa. The new sidings will be removed prior to the operational phase.

- 4.2.5 The additional land required for the provision of the Greenford station passing loop is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES for: agriculture, forestry and soils, air quality, community, cultural heritage, landscape and visual assessment, socio-economics, sound, noise and vibration, traffic and transport, and water resources and flood risk assessment. However there were changes where reassessment was considered to be required for ecology and land quality.

Ecology

Introduction

- 4.2.6 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 main ES.

Scope, assumptions and limitations

- 4.2.7 Updates to the scope of the assessment for ecology are as set out in Volume 1 of the SES₃ and AP₄ ES. 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: CT-001-000/5).
- 4.2.8 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 AP₄ revised scheme.

Existing baseline

- 4.2.9 The ecological baseline of the land required for the amendment has been based on desk-study information and field data collated for the main ES (Volume 2, CFA₅, Section 7).
- 4.2.10 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, CFA₅, Section 7 of the main ES and in Volume 5, including maps EC-01 to EC-12 of the main ES.

Designated sites

- 4.2.11 There is one LWS relevant to the assessment, namely the Central Line and Castle Bar Branch Railsides SBI.II¹¹ which comprises predominantly of a mosaic of scattered

¹¹ This site was referred to as Central Line and West Ruislip SBI.II in the main ES, but its name has been changed since production of the main ES.

trees, scrub, ruderal vegetation and grassland. The site is of district/borough value. It is located within the land required for the amendment.

Habitats

- 4.2.12 The land required for the amendment comprises predominantly a mosaic of scattered trees, scrub, ruderal vegetation and grassland of district/borough value as reported in the main ES (Volume 2, CFA₅, Section 7).

Protected and/or notable species

- 4.2.13 Notable terrestrial invertebrate assemblages are present along the railway land at the Greenpark Way ventilation shaft location and are of up to district/borough value, as reported in the main ES Volume 2, CFA₅, Section 7. The ventilation shaft is approximately 650 m from the land required for the amendment but there is habitat connectivity to the area to be affected which is also suitable invertebrate habitat.
- 4.2.14 Field survey, as reported in the main ES Volume 2, CFA₅, Section 7, indicates low populations of common reptiles, including slow worm, which were recorded in the small areas of rail land adjacent to Greenpark Way ventilation shaft location and are therefore likely to be present in this area of railway land. Reptile populations in the railway land at this location are of local/parish value.
- 4.2.15 Field surveys undertaken indicate that bat assemblages foraging and commuting along railway land near Greenpark Way ventilation shaft location comprise common and soprano pipistrelles and occasional noctule, *Nathusius'* and *Myotis* species. Bat assemblages at this location are of local/parish value as reported in the main ES Volume 2, CFA₅, Section 7.
- 4.2.16 Breeding bird assemblages of local/parish value are present in the railway land near Greenpark Way ventilation shaft as reported in the main ES Volume 2, CFA₅, Section 7.

Future baseline

Construction (2017)

- 4.2.17 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.2.18 None of the identified developments affect the assessment of the amendment's likely construction impacts on ecology.

Operation (2026)

- 4.2.19 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.2.20 None of the identified developments affect the assessment of the amendment's likely operational impacts on ecology.

Effects arising during construction

Avoidance and mitigation measures

- 4.2.21 The assessment assumes implementation of the measures set out within the CoCP of the main ES, which includes translocation of protected species where appropriate.

Assessment of impacts and effects

Designated sites

- 4.2.22 The main ES reports the loss of approximately 6ha of the Central Line, West Ruislip Branch SBI.II, representing 11% of site. This is reported as a permanent adverse effect on integrity of the SBI which would be significant at the district/borough level. This SBI has been renamed since publication of the main ES and is now known as the Central Line and Castle Bar Branch Railsides SBI.II.
- 4.2.23 The construction of the amendment will result in the loss of approximately 1.4ha of Central Line and Castle Bar Branch Railsides SBI.II, representing approximately 2.5% of the site. The permanent loss of this area of habitat will result in a different effect to that reported in the main ES. However, it will remain significant at the district/borough level, as reported in the main ES.

Habitats

- 4.2.24 The construction of the amendment will result in the loss of approximately 0.3 ha of a rail side mosaic of scattered trees, scrub, ruderal vegetation and grassland and 1.1 ha of bare ground and track. The permanent loss of the small area of mosaic habitat will result in an adverse effect which will not be significant.

Protected and/or notable species

- 4.2.25 The construction of the amendment will result in a permanent loss of habitat that could support notable terrestrial invertebrates. However, given the small scale of the habitat losses it is unlikely that the amendment will result in a significant adverse effect on these populations of terrestrial invertebrates.
- 4.2.26 The construction of the amendment will result in the loss of a small area of suitable terrestrial habitat for common reptiles. Implementation of the CoCP will reduce the risk of killing/injury of reptiles. The resulting adverse effect will not be significant.
- 4.2.27 The construction of the amendment will also result in a loss of a mosaic of habitat that could support foraging and commuting bats including both common and rarer species. However, sufficient foraging habitat will remain, and access along the corridor will still be possible. The resulting effect would not be significant.
- 4.2.28 The construction of the amendment will result in a loss of habitat that could support breeding birds, but the resulting effect would not be significant.

Cumulative effects

- 4.2.29 The construction of the amendment will result in the loss of approximately 1.4ha of rail side mosaic of scattered trees, scrub, ruderal vegetation and grassland within the Central Line and Castle Bar Branch Railsides SBI.II (including 1.1ha of bare ground and track) in addition to the loss of approximately 0.3ha reported for the West Gate

ventilation shaft amendment (see Section 4.2). This represents a total increase of 1.7ha in the land required within the Central Line and Castle Bar Branch Railsides SBI.II compared with the original scheme. In combination there will be a total habitat loss of approximately 7.7ha from the SBI. This is a different effect to that reported in the main ES, however the effect will remain significant at the district/borough level as reported in the main ES.

Mitigation and residual effects

Other mitigation measures

- 4.2.30 Once construction is completed all the areas of habitat affected in the Central Line and Castle Bar Branch Railsides SBI.II will be allowed to naturally regenerate. With the implementation of the mitigation measures proposed, the new or different ecological effects arising from the AP4 revised scheme are reduced to a level where they are not significant. The significant effects of the AP4 revised scheme in this area are therefore unchanged from those reported in the main ES.

Residual effects

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

Effects arising from operation

- 4.2.32 There are no new or different significant operation effects for ecology as a result of the proposed amendment, in comparison with the main ES.

Land quality

Introduction

- 4.2.33 This section of the report describes the environmental baseline in relation to land quality 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 main ES.

Scope, assumptions and limitations

- 4.2.34 The assessment scope, key assumptions and limitations for land quality 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

- 4.2.35 The baseline land quality information for CFA5 Northolt Corridor is described in the main ES (Volume 2, CFA5, Section 8).
- 4.2.36 The construction is anticipated to be within the shallow soils (largely the existing made ground) which overlie the London Clay Formation. All works will be undertaken solely within existing railway land.
- 4.2.37 In addition, a summary of the CSM for areas associated with the amendment is provided in Table 6.

SES₃ and AP₄ ES Volume 2 – CFA 5, Northolt Corridor

Table 6: Summary of baseline CSM for sites which may pose a contaminative risk for the amendment

Area reference ²²	Area name and classification	Main potential impacts	Main baseline risk ²³
AP ₄ -5-001	Former and existing on-site railway land	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated shallow perched/groundwater.	Moderate/low
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate/low
		Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind).	Very low
		Potential impact to offsite receptors from wind-blown dust.	Low
		Lateral and vertical migration of mobile contamination to the Grand Union Canal.	Low
		Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes).	Moderate/low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits.	Low
AP ₄ -5-079, AP ₄ -5-111, AP ₄ -5-109	Off-site industrial estates and former confectionery/unspecified factory	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated shallow perched/ groundwater.	Moderate/low
		Potential impact on human health off-site from migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Very low
		Off-site migration of wind-blown dust	Very low

²² Each area is assigned a unique identification number.

²³ The moderate or high risks identified reflect the uncertainty in existing baseline information. Whilst there are unlikely to be properties or receptors that experience the reported high or moderate existing baseline risk in the absence of site investigation, a precautionary, worst-case risk is reported in the table.

Area reference ¹²	Area name and classification	Main potential impacts	Main baseline risk ¹³
		Lateral and vertical migration of mobile contamination to the Grand Union Canal.	Low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits.	Low

Future baseline

Construction (2017)

- 4.2.38 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2017, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.2.39 None of the identified developments affect the assessment of the amendment’s likely construction impacts on land quality.
- 4.2.40 The potential for the baseline to change in the lead up to the construction of the amendment is limited to the extent to which any new development necessitates remediation or mitigation measures to control potential contamination releases. Any new development in the study area on potentially contaminated land will need to be suitable for its intended use as set out in the NPPF. To meet this requirement new development sites may require remediation to be undertaken. This will mean that some areas described as having potentially contaminative current and/or historical land use, may no longer be of significance at the time of construction.

Operation (2026)

- 4.2.41 Volume 5: Appendix CT-004-000 of the SES₃ and AP₄ ES provides details of the developments which are assumed to have been implemented by 2026, additional to those identified in the main ES, SES and AP₂ ES and SES₂ and AP₃ ES.
- 4.2.42 None of the identified developments affect the assessment of the amendment’s likely construction impacts on land quality.
- 4.2.43 The low permeability nature of the London Clay effectively acts as a barrier to the downward migration of any contamination and will offer protection to the underlying aquifers and prevent migration of contamination into the adjacent Grand Union Canal. Potential site risks to human health and the adjacent Grand Union Canal have been identified however with suitable measures undertaken, such as those in the draft CoCP, the risks are considered to be not significant.
- 4.2.44 The alteration of land requirements will therefore not give rise to any new or different significant construction effects and will not change the level of significance of the effects reported in the main ES.
- 4.2.45 Table 7 presents the summary of the construction effects obtained from a comparison of the baseline and construction impacts. The construction risk assessment takes into account the implementation of the mitigation measures set out within the draft CoCP.

Effects arising during construction

Table 7: Summary of temporary (construction) effects

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
AP4-5-001	Former and existing on-site railway land	<p>Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated water = Moderate/low.</p> <p>Potential impact to human health on-site from contamination by inhalation of asphyxiative or explosive ground-gases = Moderate/low.</p> <p>Potential impact to off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind) = Very low.</p> <p>Potential impact off-site receptors due to migration of wind-blown dust = Low.</p> <p>Potential lateral and vertical migration of mobile contamination to the Grand Union Canal = Low.</p> <p>Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes) = Moderate/low.</p> <p>Offsite migration of hazardous gas and vapours to confined spaces via permeable strata or conduits. = Low.</p>	<p>Pathway not present²⁴</p> <p>Pathway not present</p> <p>Very low</p> <p>Low</p> <p>Low</p> <p>Moderate/low</p> <p>Low</p>	Negligible (not significant)
AP4-5-079, AP4-5-111, AP4-5-109	Off-site industrial estates and former confectionery/unspecified factory	<p>Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters = Low to Moderate/Low.</p> <p>Potential impact on human health off-site from migration of soil vapours and volatile organic compounds (by diffusion or due to wind) = Very low.</p> <p>Off-site migration of wind-blown dust = Very low.</p> <p>Potential lateral and vertical migration of mobile contamination to the Grand Union Canal = Low.</p>	<p>Pathway not present</p> <p>Very low</p> <p>Very low</p> <p>Low</p>	Negligible (not significant)

²⁴ The implementation of the CoCP means that the risk of human exposure to potential contamination during construction will be mitigated and controlled.

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
		Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes) = Low.	Low	

4.2.46 The main potential risks identified are associated with human health on-site where existing railway land is affected by the amendment. It is expected that the measures adopted in the draft CoCP will ensure that risks to human health will not be increased over baseline conditions and in some instances may improve during construction as remediation is progressed. This relates largely to the removal of potentially contaminated existing made ground and the placement of new track bed materials.

4.2.47 It is considered unlikely that additional remediation works will be required over and above the mitigation measures contained as standard in the draft CoCP.

Effects arising from operation

4.2.48 The two loop tracks will be removed prior to operation therefore no effects will be present during the operational phase. The SES3 and AP4 ES, Volume 5: Appendix LQ-001-005 provides an assessment of the effects post-construction, following removal of the two loop tracks and remediation works, which will have a negligible to minor beneficial effect which is not significant. The amendment will therefore 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.

Mitigation and residual effects

4.2.49 There may be ongoing monitoring requirements following remediation works carried out during construction. Such monitoring, including monitoring of groundwater quality or ground gas, could extend into the operational phase of the AP4 revised scheme.

4.2.50 No new or different significant residual effects on quality occur as a consequence of the amendment. The significant residual effects of the AP4 revised scheme in this area are therefore unchanged from those reported in the main ES.

Cumulative effects

4.2.51 There are no new or different likely significant cumulative effects for land quality as a result of the AP4 amendments interacting with one another, the AP2 amendments or any relevant committed development.

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

4.2.52 The additional land required for the provision of the Greenford Station passing loop does not change the significant residual environmental effects or mitigation as set out in the main ES (Volume 2, CFA7) for any environmental topic.

5 Combined effects of amendments in this CFA due to changes in traffic flows

- 5.1.1 All of the effects of the changes proposed in this CFA have been described in Section 4 and there are no further combined effects to report.

High Speed Two (HS2) Limited

One Canada Square
London E14 5AB

T 020 7944 4908

E hs2enquiries@hs2.org.uk

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