

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement 2 and Additional Provision 3 Environmental Statement

Volume 2 | Community forum area report
CFA1 | Euston station and approach

September 2015

SES2 and AP3 ES 3.2.1.1



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Department for Transport

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Structure of the HS2 Supplementary Environmental Statement 2 and Additional Provision 3 Environmental Statement

The Supplementary Environmental Statement 2 (SES2) and Additional Provision 3 Environmental Statement (AP3 ES) comprises:

- non-technical summary (NTS). This provides a summary in non-technical language of the SES2 (Part 1) and AP3 ES (Part 2) and of the likely significant environmental effects, both beneficial and adverse, including those 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'). In the case of community forum areas (CFAs) 4 and 5 and relevant route-wide effects, account is also taken of the Supplementary Environmental Statement (SES) and Additional Provision 2 Environmental Statement (AP2 ES) submitted in July 2015;
- Volume 1: introduction to the SES2 and AP3 ES. This introduces the supplementary environmental information and design changes included within SES2 and amendments which have resulted in the need to amend the Bill within the AP3 ES. It also explains any changes to the scope, methodology, assumptions and limitations required for the environmental impact assessment;
- Volume 2: CFA reports and map books. It should be noted that the structure of the CFA reports within Volume 2 vary as follows:
 - CFA1 is split into two parts. Part 1 comprises the SES2 for the Euston station and Approach area. Part 2 describes the amendments requiring additional provisions in the Bill. Part 1 is further split into Part 1A and Part 1B. Part 1A provides a summary of: new environmental baseline information; a description of the revised scheme for Euston, including a comparison with the original scheme described in the main ES, and key changes to the likely residual significant effects arising from the revised scheme for Euston station and Approach area compared to the original scheme. Part 1B provides a complete assessment of the revised scheme for Euston station and approach

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area, whether or not these are different likely significant environmental effects from those reported in the main ES. This assessment includes any effects of the amendments to the Bill. It should be noted that the SES2 and AP3 ES Volume 2 CFA1 report therefore replaces the Volume 2, CFA1 report of the main ES;

- CFAs 2 and 3 report any new or different likely significant environmental effects arising from the SES2 changes and AP3 amendments compared to those reported in the main ES; and
- CFAs 4 and 5 report any new or different significant environmental effects arising from the SES2 changes compared to the SES submitted in July 2015 and taking into account any relevant AP2 amendments assessed in the AP2 ES submitted in July 2015.
- Volume 3: route-wide effects. This reports new or different likely significant route-wide effects arising from the supplementary environmental information included within the SES2 (Part 1) and amendments within the AP3 ES (Part 2) compared to those reported in the main ES as updated by the SES. The AP2 amendments are also taken into account where relevant;
- Volume 5: appendices and map pbooks. This contains environmental information and associated maps in support of the CFA sections of Volume 2; and
- glossary of terms and list of abbreviations. This contains any new or different terms and abbreviations which are not already explained in the main ES.

In the main ES, Volume 4 presented an assessment of the likely significant environmental effects that will occur in locations away from the route (i.e. outside the CFAs). As none of the SES2 design changes or AP3 amendments relate to off-route areas, off-route effects have been scoped out of the assessment. Consequently, the SES2 and AP3 ES does not contain a Volume 4.

Structure of this report

This report is divided into 2 parts. Part 1 comprises the SES (SES2) for the Euston station and approach area (CFA1). Part 2 provides a description of the specific amendments to the land required and scheduled works, which are amendments to the provisions of the Bill (AP3 ES).

Part 1 is further divided into Part 1A and Part 1B.

Part 1A provides a summary of:

- updated and new environmental baseline information with respect to updated Transport for London (TfL) Railplan and Central London Highway Assessment Model (CLOHAM)¹ models;
- changes in the planning policy context at Euston;
- a description of the corrections in the contents of the main ES required since the submission of the main Bill;
- a summary of the revised scheme for the Euston station and approach area and a comparison between that and the original scheme described in the main ES including:
 - a brief description of the original scheme;
 - the changes to design and construction staging included in the revised scheme; and
 - a summary of operational changes; and
- a summary of changes to the likely residual significant effects arising from the revised scheme for Euston compared to the original scheme.

Part 1B provides a replacement ES for CFA1, which presents a complete assessment of the revised scheme for Euston, including the effect of the amendments, which are considered further in Part 2. Part 1B therefore replaces CFA1 Volume 2 of the main ES and includes the following information:

- overview of the area;
- description of the revised scheme for Euston;
- construction of the revised scheme for Euston;
- construction staging and programme;
- operation of the revised scheme for Euston;
- stakeholder and community engagement;

¹ These are transport planning models for forecasting and assessing rail and highway network use.

- route section main alternatives; and
- an assessment for the following environmental topics;
 - agriculture, forestry and soils (Section 6);
 - air quality (Section 7);
 - community (Section 8);
 - cultural heritage (Section 9);
 - ecology (Section 10);
 - land quality (Section 11);
 - landscape and visual assessment (Section 12);
 - socio-economics (Section 13);
 - sound, noise and vibration (Section 14);
 - traffic and transport (Section 15); and
 - water resources and flood risk assessment (FRA) (Section 16).

Each environmental topic section comprises: an introduction to the environmental topic; a description of the environmental baseline within the area; the likely significant environmental effects arising during construction and operation of the revised scheme for the Euston station and approach area and proposed mitigation measures for any significant adverse effects.

Environmental effects have been assessed in accordance with the methodology set out in Volume 1, the Scope and Methodology Report (SMR) (see Volume 5: Appendix CT-001-000/1), the SMR Addendum (see Volume 5: Appendix CT-001-000/2), the SMR Addendum 2 (see Volume 5: Appendix CT-001-000/3) and the SMR Addendum 3 (see Volume 5: Appendix CT-001-000/4).

The maps relevant to Euston station and approach are provided in a separate corresponding document entitled SES2 and AP3 ES Volume 2: CFA1 Map Book, which should be read in conjunction with this report.

The revised scheme described in this report is that shown on the Map Series CT-05 (construction) and CT-06 (operation) (SES2 and AP3 ES Volume 2, CFA1 Map Book).

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 Bill, if enacted by Parliament, will provide the powers to construct, operate and maintain Phase One of HS2.
- 1.1.2 Following deposit in November 2013 and subsequent consultation with stakeholders, HS2 Ltd undertook a wide ranging review of the delivery of HS2 Phase One, taking account of the recommendations in HS2 Plus, published in March 2014². The review focussed on two key issues with the original scheme at Euston:
- whether the original scheme could be delivered without unacceptable disruption to existing services in light of continuing growth in demand for national rail and other public transport serving Euston; and
 - the extent to which it was compatible with and would facilitate the delivery of the wider vision in the Euston Area Plan (EAP)³.
- 1.1.3 Following the HS2 Plus report, the Department for Transport (DfT), HS2 Ltd, Network Rail (NR) and TfL began to develop revised proposals for the station. This has involved the reconsideration of previous options and the development of new options in the light of the changed requirements. The principal elements of the revised scheme for Euston can be summarised as follows:
- the staged construction of the high speed station with subsurface platforms and ground level concourses;
 - the staged provision of improved access and public transport facilities to support the high speed and conventional stations and to facilitate further development;
 - the station and approach have been designed to facilitate potential oversite development (OSD⁴) in order to help meet the aspirations of the EAP;
 - improvements to public realm and replacement open space;
 - the redesign of the replacement Hampstead Road Bridge;

²HS2 Plus: a report by David Higgins, DfT, March 2014.

³ Greater London Authority, Transport for London and London Borough of Camden (2015), *Euston Area Plan: a new plan for The Euston Area*, which is also Supplementary Planning Guidance to the London Plan.

⁴ OSD is potential development, not included in the revised scheme being proposed by HS2 Ltd that may be promoted by others, either over the high speed railway or on land returned after construction. This will require separate planning permissions, supported by an Environmental Statement. The station accommodation and buildings included in the revised scheme are not OSD.

- the reinstatement of Line X, one of the approach tracks to the existing conventional station;
- the construction of ancillary works⁵ to enable OSD; and
- utility diversions and improvements.

- 1.1.5 The design and staged construction programme of the revised scheme for Euston has been planned to minimise disruption to the operation of the conventional station, but also to be compatible with the potential future redevelopment of the conventional station. At least 16 platforms in the existing conventional station will be retained until 2026 to meet train operator requirements, while the first six high speed platforms are under construction.
- 1.1.6 After 2026, the existing station will be reduced to a minimum of 11 platforms to allow for the construction of five additional high speed platforms by 2033. The additional capacity for travel to and from the West Midlands will be provided by the six high speed platforms, operational by this stage. On completion in 2033, there will be a minimum of 11 conventional platforms and 11 high speed platforms. The high speed station will therefore be constructed in two stages: the first to allow operation of HS2 Phase One to commence in 2026 (construction Stage A, between 2017 and 2026) and the second to provide additional platforms for long-term capacity and HS2 Phase Two services in 2033 (construction Stage B1, between 2026 and 2033).
- 1.1.7 The construction programme stages for the revised scheme assume that, at some future date, the remainder of the conventional station could be redeveloped by NR. This potential future construction stage has been described as Stage B2. There are at present no details of the form that this development might take. As such, the assessment of the revised scheme does not take account of the potential redevelopment of the conventional station.
- 1.1.8 It should be noted that 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 assessment.

⁵ Works, included in the revised scheme, that will be undertaken to facilitate OSD. These are works that can only practicably be carried out during the construction of the high speed station and railway.

Part 1: Supplementary Environmental Statement 2

Part 1A: Summary of new environmental baseline information, the revised scheme for Euston and changes to likely residual significant effects

2 New environmental baseline information and policy context

2.1 Environmental baseline

2.1.1 Since the main ES was prepared, there have been a small number of updates to the environmental baseline relevant to CFA1. These are addressed in more detail in the relevant topic sections in Part 1B, the SES2, which is the replacement Volume 2 ES for CFA1.

2.1.2 Since the main ES was prepared, TfL has updated certain public and highway transport planning models used in the assessment, in this case, the London Transportation Study (LTS), Railplan and the CLoHAM. These updates have incorporated new baseline data, background growth assumptions and committed transport schemes. In particular, Railplan now includes significantly higher estimates of underlying growth in rail passenger demand than that used in the main ES, while CLoHAM incorporates the latest committed highway improvement schemes. Both are relevant when considering the use of the existing station, including the underground stations, at Euston, without HS2.

2.2 Changes in the planning policy context at Euston

2.2.1 The case for HS2, with a terminus at Euston, is well established in national and regional transport and planning policy. This was set out in the HS2 Strategic Case, summarised in Volume 1, Sections 2 and 10 of the main ES.

2.2.2 HS2 Ltd, with NR and the DfT, has worked closely with the London Borough of Camden (LBC), the Greater London Authority (GLA) and TfL throughout the preparation of the EAP. However, because of the timing of the submission of the main ES, the original scheme could only seek to reflect the policies and proposals in the consultation draft EAP, published in July 2013.

2.2.3 The EAP was subject to public examination in July 2014 and adopted in January 2015. It takes forward the objectives and aspirations for delivering a comprehensive transport and development framework at Euston already set

out in the London Plan 2011⁶ and Further Alterations 2015⁷, the Mayor's Transport Strategy⁸ and the Camden Core Strategy⁹.

- 2.2.4 The adopted EAP provides a comprehensive strategic vision for the redevelopment and wider regeneration of the Euston area, including the high speed and the conventional station. It is based on achieving 11 strategic objectives, which include objective 3 'making the best use of the new space above the station and tracks and opportunities for regeneration in the wider area'. The development principles in the EAP include promoting 'comprehensive commercially led mixed-use development above and around the new and existing stations'.
- 2.2.5 Since submission of the Bill, in consultation with key stakeholders, HS2 Ltd undertook a wide ranging review of the delivery of HS2 Phase One, as recommended in the HS2 Plus report, published in March 2014. This reaffirmed HS2 Ltd's commitment to ensuring that the scheme at Euston will help facilitate the delivery of the wider vision in the adopted EAP.
- 2.2.6 In preparing the revised scheme, HS2 Ltd has continued to work closely with key stakeholders and the local community to help deliver the wider vision and these development aspirations.

2.3 Corrections to the main ES

- 2.3.1 Since submission of the Bill, the need for a number of corrections in the contents of the main ES has been identified. Table 1 provides a list of those instances where there has been a need to correct the Volume 2 CFA report for Euston station and approach because of the potential to alter the significant environmental effects reported in the main ES or a factual inaccuracy relating to significant effects has been identified. The table gives the location of the correction in the main ES, the reason for the correction, replicates the text from the main ES, where applicable provides revised text, and identifies whether the correction changes a significant effect reported in the main ES. Where relevant, these corrections have been taken into account in the technical assessments contained within Sections 6–16 of this report. The assessment of the revised scheme in Part 1b reflects the corrections in Table 1, as well as updates to baseline and changes in design where relevant.

⁶ Mayor of London (2011), *The London Plan – Spatial Development Strategy for Greater London*.

⁷ Mayor of London (2015), *Further Alterations to the London Plan*.

⁸ Greater London Authority (2010), *Mayor's Transport Strategy*.

⁹ London Borough of Camden, (2010), *Adopted Core Strategy*.

Table 1: Summary of corrections to the main ES in CFA1

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
<p>Community</p> <p>Paragraph 2.4.16, Table 1, CFA1 of the main ES.</p> <p>and</p> <p>Paragraph 5.4.19, CFA1 of the main ES.</p>	<p>The description of the demolition of the Bree Louise public house omitted that one residential dwelling is also at the property.</p> <p>The main ES reported 214 dwellings to be demolished. This figure should have been stated as 215.</p>	<p>(Table 1 entry 12 reads):</p> <p>3 storey masonry public house</p> <p>Bree Louise public, house, 69 Cobourg Street</p> <p>(Paragraph 5.4.19):</p> <p>The construction works for the expansion and remodelling of Euston station and widening of the station approach will require the demolition of 214 dwellings...</p>	<p>(Table 1 entry 12 should read):</p> <p>3 storey masonry public house (1 flat)</p> <p>Bree Louise public house, 69 Cobourg Street.</p> <p>(Paragraph 5.4.19):</p> <p>The construction works for the expansion and remodelling of Euston station and widening of the station approach will require the demolition of 215 dwellings...</p>	<p>No, the revision corrects a factual inaccuracy with the main ES. There are no changes to the significant effects or mitigation measures reported in the main ES.</p>
<p>Sound, noise and vibration</p> <p>Paragraph 11.5.9, Volume 2, CFA1 of main ES.</p>	<p>The main ES did not report that Cartmel was estimated to qualify for noise insulation as a result of operational noise.</p>	<p>Text omitted from main ES.</p>	<p>In this area the assessment has identified one residential building, Cartmel, near Hampstead Road, represented by receptor 535446, where noise from the Proposed Scheme would exceed the daytime trigger threshold set in the Noise Insulation Regulations 1975. As the overall sound levels at the receptor are not forecast to change by 1dB or more, this building would be unlikely to qualify for noise insulation as a result of the Regulations. However, as the forecast night-time noise level would exceed the World Health Organization's Interim Target of 55dB, it is estimated that these buildings will be offered noise insulation.</p> <p>The predicted operational airborne sound levels at this assessment location are presented in main ES Appendix SV-004-001. This building is shown on AP3 ES Map series SV-02 (Volume 5, Sound, Noise and Vibration Map Book).</p>	<p>No. There is no change to significant effects, as it is likely that the dwellings in Cartmel would qualify for improved noise insulation which will reduce noise inside all dwellings such that it does not reach a level where it would significantly affect residents.</p> <p>See Section 14 for sound, noise and vibration assessment of the revised scheme on Cartmel.</p>

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
Traffic and transport Paragraph 12.4.18, Table 21, Volume 2, CFA1 of the main ES Table 6.46 Volume 5 Appendix – Transport Assessment – TR-001- 000 London Assessment (CFA1).	Barnby Street incorrectly reported as closed in Scenario 1 (2017).	Barnby Street Closed – Yes (2017).	Barnby Street Closed – No (2017).	None.
Traffic and transport Paragraph 12.4.31, Volume 2, CFA1 of the main ES.	The parking and loading assessment incorrectly reported a temporary minor significant adverse effect on Drummond Street.	... The proposed scheme will have a range of impacts on parking amenity, based on the relatively long duration of the loss of parking, offset by good availability of spaces in the local area. In summary the effects are: [9 th bullet point] <ul style="list-style-type: none"> • Drummond Street (minor adverse effect); 	(deleted text)... Drummond Street (minor adverse effect);	Yes, a change in the reported significance; reducing from a temporary minor adverse significant effect to no effect.
Traffic and transport Paragraph 12.5.34, Volume 2, CFA1 of the main ES.	The parking and loading assessment reported a permanent loss of approximately 88 on-street parking spaces due to the enlarged station footprint. This was reported as not significant.	It is envisaged there will be a permanent loss of approximately 88 on-street parking spaces due to the enlarged station footprint ...The loss of the spaces associated with the enlarged station footprint as part of the Proposed Scheme has therefore been assessed as not significant.	During operation, there will be a permanent loss of on-street parking on a number of local roads. In summary, the locations where the effects are significant are: <ul style="list-style-type: none"> • Drummond Street (moderate adverse significant effect) - a permanent loss of approximately seven residential permit holder bays, seven motorcycle bays, one loading bay and one pay and display bay; 	Yes, a change from no significant effect to a minor adverse significant effect on a number of roads.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
			<ul style="list-style-type: none"> • Cobourg Street (major adverse significant effect) - a permanent loss of approximately 19 residential permit holder bays; • Gordon Street (major adverse significant effect) - a permanent loss of approximately two loading bays; • Cardington Street (major adverse significant effect) - a permanent loss of 45 pay and display bays, one car club bay, one coach bay, four taxi bays and two bus stands; and • Melton Street (major adverse significant effect) - a permanent loss of three car club bays. 	
Landscape and visual assessment	The main ES did not include a viewpoint in this location: Viewpoint 001.5.011: view east from the Wesley Hotel. Potential effects during construction were not assessed.	Text omitted from main ES.	<p>Viewpoint 001.5.011: view east from the Wesley Hotel</p> <p>The high speed station footprint and below ground works will require the demolition of the three storey buildings along sections of both Cobourg Street and Euston Street, opening up views to the north and east. Construction activity will be visible in the foreground and middle ground of the view from the upper storeys looking east and in oblique views looking north-east. In the context of a central London location, the overall magnitude of change will be medium as hoardings, construction works and new features will be clearly seen but largely characteristic of the existing setting.</p> <p>The medium magnitude of change assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect.</p> <p>Effects at night will be non-significant in a context of existing street lighting and are reported in Volume 5: Appendix LV-001-001, Part 4.</p>	Yes, the assessment of the added viewpoint (Viewpoint 001.5.011) results in an additional moderate adverse significant effect for construction for this viewpoint.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
Landscape and visual assessment	The main ES did not include a viewpoint in this location: Viewpoint 001.5.011: view east from the Wesley Hotel. Potential effects during operation were not assessed.	Text omitted from main ES.	<p>Viewpoint 001.5.011: view east from the Wesley Hotel</p> <p>The demolition of buildings east of Cobourg Street will have opened up eastward views. The new high speed station will be visible in the background. The removal of the buildings and resultant opening up of views of the station represents an alteration to one of the key characteristics of this view. Overall, there will be a medium magnitude of change.</p> <p>The medium magnitude of change, assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect in both winter and summer of year 1.</p> <p>The significance of effect in year 15 and year 60 will remain unchanged due to the lack of intervening buildings or vegetation.</p> <p>Effects at night will be non-significant and are reported in Volume 5: Appendix LV-001-001, Part 4.</p>	Yes, the assessment of the added viewpoint (Viewpoint 001.5.011) results in an additional moderate adverse significant effect for operation for this viewpoint.
Landscape and visual assessment	The main ES did not include a viewpoint in this location: Viewpoint 003.2.009: view east from dwellings on Park Village East (between Silsoe House and Nash House). Potential effects during construction and operation were not assessed.	Text omitted from main ES.	<p>Viewpoint 003.2.009: view east from dwellings on Park Village East (between Silsoe House and Nash House)</p> <p>Works for the proposed scheme will be located less than 10m from the dwellings along Park Village East and there will be direct and close views of construction works. The demolition of the carriage shed (to the south) and removal of the parapet wall, planters and associated tree/shrub planting will open up views and large construction plant will be present in the foreground and middle ground of the views. Views of the utility works, the piling works associated with the construction of the retaining wall along Park Village East, construction of the high speed dive under and the Mornington Street Bridge works. The presence of 2.4m high hoardings will partially screen the construction works from ground level during the phased</p>	Yes, the assessment of the added viewpoint (Viewpoint 003.2.009) results in an additional major adverse significant effect for construction for this viewpoint.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
			<p>closure of the road but will be prominent in the foreground of the view. The parapet wall, planters and associated tree and shrub planting will be reinstated at the end of construction and replacement tree planting will be provided on both sides of the Mornington Street Bridge in Park Village East. Overall, the construction activities will be highly visible, large scale and prominent in the foreground of the view. Therefore, the magnitude of change will be high.</p> <p>The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in major adverse significant effect.</p> <p>Effects at night will be non-significant and are reported in Volume 5: Appendix LV-001-001, Part 4.</p>	
Landscape and visual assessment	The main ES did not report a significant effect during construction at Viewpoint 001.6.003: view north-east from 215 Euston Road.	Text omitted from main ES.	<p>Viewpoint 001.6.003: view north-east from 215 Euston Road</p> <p>Intervening buildings and vegetation will screen the views from pedestrians and vehicles looking east along Euston Street towards the construction works. Cranes will be visible in the background above intervening buildings and vegetation representing a change in the background of the view, as a series of components in the wider panoramic view. Trees, which are a key characteristic of this view, will be removed along Euston Road and many trees will also be removed from Euston Square Gardens. The buildings in the foreground will screen the majority of the construction activity and views from the buildings will be oblique. Overall, the magnitude of change will be medium.</p> <p>The medium magnitude of change assessed against the low sensitivity of the receptor will result in a moderate adverse significant effect.</p>	Yes, a change from no significant effect to a moderate adverse significant effect on this viewpoint (Viewpoint 001.6.003) for construction.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
Landscape and visual assessment	The main ES incorrectly reported a significant effect during operation at Viewpoint 004.2.005: view south-west from Mornington Crescent (numbers 1 to 12) and Hampstead Road (numbers 261 to 263).	<p>Viewpoint 004.2.005: view south-west from Mornington Crescent (numbers 1 to 12) and Hampstead Road (numbers 261 to 263)</p> <p>9.5.72 There will be close and direct view of the reconstructed and realigned Granby Terrace Bridge in the foreground, beyond which to the south there will be oblique views of Hampstead Road Bridge. The existing and extended railway corridor will cross the length of the view; the loss of the carriage shed and new retaining wall and parapet will represent a change but will be largely characteristic of the existing view as will the loss of three residential blocks in the Regent's Park Estate. Langdale and the proposed open space, Augustus House and Cubitt Court (100 Park Village East) will form the background of the view screening the majority of views of the Regent's Park Estate beyond. Therefore, the overall magnitude of change is considered to be medium.</p> <p>9.5.73 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse effect in the winter of year 1 of operation.</p> <p>9.5.74 In summer of year 1 of operation, effects will be unchanged</p>	Paragraphs 9.5.72 to 9.5.75 of the main ES should not be present.	Yes, a change from a moderate adverse significant effect to no significant effect on this viewpoint (Viewpoint 004.2.005) for operation.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
		<p>because there is no intervening planting.</p> <p>9.5.75 By year 15 and beyond to year 60 of operation, the absence of mitigation planting means that effects will be unchanged.</p>		
Landscape and visual assessment	The main ES did not report a significant effect during operation at Viewpoint 001.6.024: view east from 1 to 9 Melton Street.	Text omitted from main ES.	<p>Viewpoint 001.6.024: view east from 1 to 9 Melton Street</p> <p>The demolition of Grant Thornton House and One Euston Square and the removal of the mature trees in Euston Square Gardens and along Melton Street will have opened up views over the new high speed station. There will be open views towards the reinstated Euston Square Gardens. A new London Underground and station escape building will be present at the western end of Euston Square Gardens. Melton Street will be open to access for the bus station and will incorporate areas of public realm where pedestrian usage is prioritised and links provided to connect with the wider network of streets and spaces. Overall, the magnitude of change will be high.</p> <p>The high magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse significant effect in year 1.</p> <p>In summer of year 1 of operation, effects will be unchanged as the new planting will be immature.</p> <p>By year 15 and year 60 of operation, the proposed planting will be established but unlikely to recreate the stature of the existing trees due to the constraints of the underground structures limiting potential root growth, therefore the significance of effects will be unchanged.</p>	Yes, the assessment of the viewpoint (Viewpoint 001.6.024) results in an additional moderate adverse significant effect for operation.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
Landscape and visual assessment	The main ES did not report a significant effect during operation at Viewpoint 002.6.002: view north-west from Euston Fire Station.	Text omitted from main ES.	<p>Viewpoint 002.6.002: view north-west from Euston Fire Station</p> <p>The removal of the mature trees in Euston Square Gardens and along Eversholt Street will open up views across Euston Square Gardens towards the reconfigured bus station in the middle ground. The Podium will also be visible. Replacement tree planting in the reinstated gardens will not be sufficiently mature in year 1 to replicate the stature of the existing trees. The magnitude of change will be medium.</p> <p>The medium magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.</p> <p>In summer of the first year of operation, the overall effect will be unchanged on account of the immaturity of the vegetation.</p> <p>Year 15 and year 60 effects will be non-significant and are reported in Volume 5: Appendix LV-001-001, Part 4.</p>	Yes, the assessment of the viewpoint (Viewpoint 002.6.002) results in an additional moderate adverse significant effect for operation.
Landscape and visual assessment	The main ES did not report a significant effect during construction at Viewpoint 002.5.012: view west from Travelodge.	Text omitted from main ES.	<p>Viewpoint 002.5.012: view west from Travelodge</p> <p>There will be direct and close views of construction works from the Travelodge across Eversholt Street. Trees lining Eversholt Street and a number within Euston Square Gardens will be removed to facilitate construction activities. The removal of mature trees in the gardens will open up some views of the Euston Square Gardens (east) satellite compound in the middle ground. Other potential views will be screened by the Podium and 1 Eversholt Street. Cranes and other large plant will be visible in the background above intervening buildings. The magnitude of change will be medium.</p>	Yes, the assessment of the viewpoint (Viewpoint 002.5.012) results in an additional moderate adverse significant effect for construction.

Reference in the relevant ES	Reason for correction	Text in the main ES	Revised text	Change to significant effects and mitigation
			<p>The medium magnitude of change, assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect.</p> <p>Effects at night will be non-significant and are reported in Volume 5: Appendix LV-001-001, Part 4.</p>	

3 Summary of the revised scheme for Euston and comparison with the original scheme

3.1 Introduction

- 3.1.1 This section presents a comparison between the original scheme, as presented in the CFA1 Volume 2 report in the main ES, and the revised scheme, assessed in Part 1B, the SES2 for CFA1. It includes a summary of the key changes to the likely residual significant effects arising from the revised scheme in CFA1. It describes the original scheme; the changes to design and construction included in the revised scheme; and any operational changes that have led to changes in likely residual effects.
- 3.1.2 Although there are considerable changes to the design and programme for delivery in the revised scheme, many of these changes could still be undertaken under the powers and limits already in the Bill, subject to any environmental assessment reported in this SES2 that would amend the main ES.
- 3.1.3 A limited number of minor amendments to the Bill are necessary and these are contained in AP3. These amendments, which are detailed and assessed in Part 2 of this CFA report, are as follows:
- additional land for construction off Stephenson Way (AP3-001-001);
 - additional land for utilities diversions at Stanhope Street (AP3-001-002);
 - additional land at Barnby Street and for improvements to open space within the Amphill Estate (AP3-001-003);
 - additional land for highway works at Hampstead Road and Harrington Square (AP3-001-004);
 - additional land for the installation of ground anchors at Park Village East, north of Mornington Street Bridge (AP3-001-005);
 - additional land for extension to lorry holding area and replacement parking, Regent's Park (AP3-001-006);
 - extension of cycle track along Cobourg Street (AP3-001-007);
 - provision of access road and ramp to high speed station basement from Hampstead Road Bridge (AP3-001-008);
 - provision of taxi road and cycle track at northern station entrance from Hampstead Road (AP3-001-009);
 - provision of loop road for bus stand and welfare facilities, off Eversholt Street (AP3-001-010);
 - provision of bridge across railway for temporary utility diversions, south of Hampstead Road Bridge (AP3-001-011);

- addition of the Grade II Euston Lodges and associated structures to Schedule 17 of the Bill (AP3-001-012); and
- reinstatement of Line X (AP3-001-0013).

3.2 Description of the original scheme

- 3.2.1 The original scheme in CFA1 proposed an 11 high speed platform station, with subsurface platforms and concourse at street level, partly on the footprint of the conventional station, but extending westwards to Cobourg Street. Thirteen platforms could be retained in the conventional station, with reconfiguration of platforms, and the conventional station concourse would have been rebuilt to be integrated with the new high speed concourse to the west. Four new entrances were to be provided to the combined station, with a north-western entrance to the high speed station close to the A400 Hampstead Road, on an extended Cobourg Street.
- 3.2.2 The original scheme incorporated escalators and lifts in the high speed station and improved access to the conventional platforms; new entrances, an extended ticket hall and new escalators in Euston underground station; a pedestrian subway under Euston Square Gardens and the A501 Euston Road, with an additional entrance and ticket hall in Gordon Street. An extended linear bus station would be created between the station and Euston Square Gardens, with a taxi rank in Cobourg Street.
- 3.2.3 New retail units and ticket halls would be provided in the high speed part of the station, with retail and train servicing provided from the former parcels deck over the conventional station, accessed by a new ramp from A4200 Eversholt Street. Offices and other facilities for the station and train operations would be provided partly in buildings at the front of the station.
- 3.2.4 A new east-west link bridge for pedestrians and cyclists between Eversholt Street and Hampstead Road, immediately north of the station, was included in the original scheme.
- 3.2.5 The original scheme included creating a new wider retained cutting north of the high speed station to accommodate the approach tracks as far as Mornington Street Bridge. The high speed railway would enter into tunnels at the Euston portal about 100m south of Parkway, alongside the entrances to the conventional railway Park Street Tunnels. The high speed tracks would be deeper than the existing railway particularly close to the tunnel entrance and would require the reconstruction of the retaining walls along Park Village East and the construction of a high speed railway dive under¹⁰. The existing railway approach to the conventional station would be reduced from six to four tracks, including the closure of Line X and the existing conventional dive under, to accommodate the high speed railway.
- 3.2.6 Hampstead Road Bridge and Granby Terrace Bridge would be replaced with longer bridges and the approaches raised. Mornington Street Bridge would be reconstructed. The station and approach works would require an extensive programme of utility diversions.

¹⁰ A dive under is an underpass that allows trains to pass beneath other tracks. This maximises the number of platforms that can be accessed from an individual track avoiding conflicting train movements.

- 3.2.7 The original scheme required the demolition of 215 dwellings, principally in the Regent’s Park Estate and in Melton Street, Cardington Street and Cobourg Street, west of the station. A number of commercial premises, including Grant Thornton House and One Euston Square, office buildings in front of the station, would also be demolished.
- 3.2.8 The original scheme involved alterations to Euston Square Gardens and the removal of most of St James’s Gardens and of open space and play areas in the Regent’s Park Estate. Replacement open space would be provided north of Langdale, in the Regent’s Park Estate, as well as new and improved public realm in the forecourt to the station facing Euston Road and outside the northern Hampstead Road entrance to the high speed station.
- 3.2.9 Thirteen permanent road closures and two closures of pedestrian routes would be required for the original scheme.
- 3.2.10 Construction of the original scheme, as set out in the main ES, would take from 2015 until the end of 2026, when the HS2 Phase One services commence. During construction, no more than 13 conventional platforms could be kept in use.
- 3.2.11 Construction would be based at a main construction compound on the National Temperance Hospital site, with construction offices in the Podium in front of the station. Twelve satellite construction compounds around the station and approach in CFA1 would be used to support specific local elements of construction. In the main ES, construction traffic would access the works via the National Temperance Hospital main compound entrance, but with substantial use of the Carriage Shed and Park Village East satellite compound, north of Granby Terrace Bridge, to support excavation and construction from there northwards to the tunnel portal.
- 3.2.12 The original scheme, assessed in the main ES, was designed as a ‘freestanding station’. The design would, however, allow for certain ancillary works to be provided by HS2 Ltd to facilitate OSD, where those works could only practicably be undertaken at the same time as the high speed railway and station works.
- 3.2.13 Any proposals for OSD would need to be dealt with separately through the normal local planning process, with any planning application being determined by the relevant local planning authorities. There are provisions in the Bill which ensure that any separate planning application for OSD will have to be accompanied by an ES.

3.3 Changes to design and construction staging included in the revised scheme

- 3.3.1 Since publication of the main ES in November 2013, there have been substantial discussions and consultation with key stakeholders at Euston, including LBC, the GLA and TfL, and further work by HS2 Ltd, DfT and NR, to develop an improved design and construction staging for Euston station and approach. This has in particular, sought to improve the capacity and resilience of the conventional railway and station, during construction and over the longer term, while facilitating delivery of the wider vision in the EAP.
- 3.3.2 The revised scheme does not include the redevelopment of the conventional station, which will be for NR to progress outside the Bill powers. It does however provide for

various enabling works in the conventional station and approach to allow for the high speed railway and to sustain the operation of the conventional station.

- 3.3.3 The design review undertaken by HS2 Ltd included consideration of design options already explored before submission of the Bill and concluded that these objectives could only be met by adopting a staged, or incremental, approach to the delivery of the high speed station.
- 3.3.4 The high speed station will be constructed in two stages, the first to allow operation of HS2 Phase One services to commence in 2026 (following the completion of construction Stage A 2017-2026) and the second to provide additional platforms to allow for growth in services and to allow HS2 Phase Two services to commence in 2033 (following the completion of construction Stage B1 2026-2033). Six high speed platforms will be provided by 2026 and 11 by 2033. The first stage of the high speed station will be able to operate effectively, while the second stage is built.
- 3.3.5 In order to ensure adequate capacity and resilience for conventional rail services, a minimum of 16 platforms, rather than the 13 in the original scheme, will be maintained in the conventional station until 2026. During this period, alterations to the conventional station will be kept to the minimum needed to allow the HS2 and related works to proceed. After 2026, the conventional station will be reduced to a minimum of 11 platforms, with additional capacity for travel to and from the West Midlands provided by HS2 Phase One services. On completion in 2033, there will be 11 high speed platforms and a minimum of 11 conventional platforms, designed to meet long-term capacity requirements.
- 3.3.6 In the original scheme, it had been proposed to reduce the number of approach tracks to the conventional station from six to four to accommodate the HS2 works close to the tunnel portal. Line X, which uses an existing railway dive under beneath the conventional railway approach north of Mornington Street Bridge, was to be infilled because it conflicted with the HS2 works. In order to provide additional flexibility and resilience to the operation of the conventional rail station and West Coast Main Line (WCML) services before 2026 and greater capacity for growth in conventional services after 2026, the revised scheme includes the reinstatement of Line X.
- 3.3.7 The conventional railway dive under will be retained and connected back into the fifth approach track. Line X will need to be closed for three years during HS2 construction.
- 3.3.8 The revised scheme, which is described in detail in Section 5.2 and illustrated in Figures 2 to 7, will provide 11 subsurface high speed platforms, with ground-level concourses. The concourse areas will be roofed, with passenger facilities at ground level, with railway offices and accommodation buildings. Principal entrances to the high speed station will be from the south, from the southern forecourt and Euston Square Gardens; from the northern end of Cobourg Street; and from 2033, from a new northern entrance.
- 3.3.9 In Stage B1, the high speed concourses will be extended eastward, with a spine building above, aligned north-south to create a route through the high speed station for passengers and other pedestrians to use. This change in design allows for much greater pedestrian permeability and is compatible with the future redevelopment of the conventional station. The east-west link bridge at the northern end of the station, included in the original scheme, will not be provided in the revised scheme.

- 3.3.10 Unlike the original scheme, the provision of ancillary works to enable OSD has been fully integrated into the revised scheme design, wherever this is feasible. Ancillary works have been incorporated into the high speed station design, as far as Hampstead Road Bridge, and these will enable potential OSD in four main locations above the high speed platforms. In the approach, ancillary works for OSD are proposed over the high speed tracks between Granby Terrace Bridge and Mornington Street Bridge. However the construction of OSD will need to be authorised by separate planning applications, which will need to be supported by an ES.
- 3.3.11 The design of Hampstead Road Bridge, shown as a truss bridge in the original scheme, has been changed to a beam bridge to address stakeholder concerns about visual impact. It also provides for an access ramp into a service and logistics basement beneath the high speed station and relates to the proposed deck over the high speed railway between Hampstead Road Bridge and the high speed station.
- 3.3.12 The access ramp will be provided in construction Stage B1 and the deck will allow the provision of a northern entrance to the high speed station, with a taxi rank, cycle facilities and open space at this location. The original scheme relied on the use of the parcels deck in the conventional station to deliver station and train servicing. This would have been a constraint on any future redevelopment of the conventional station. In the revised scheme, servicing for the high speed station will be provided from a service and logistics basement beneath the high speed platforms. From 2026, this will be accessed via lifts from a service area on the deck at the north end of the high speed station, with the lift access being replaced by the access ramp from Hampstead Road Bridge in 2033.
- 3.3.13 The revised scheme will deliver the staged provision of improved access and public transport facilities to support the high speed and conventional stations. These are similar to, or improvements on, those in the original scheme. They include the provision of direct access to the Euston underground station from the high speed platforms and from a new southern entrance from the station forecourt; a new ticket hall and additional escalators and a subway pedestrian link to Euston Square underground station and under Euston Road to a new Gordon Street underground entrance. There will be staged provision of new taxi facilities, with temporary arrangements in front of the station and in Eversholt Street until 2026; a temporary taxi pick up and set down in Cobourg Street after 2026, before a permanent taxi rank is provided at the northern high speed station entrance in 2033 supplemented by set down in Eversholt Street. The existing bus station north of Euston Square Gardens will remain until 2033, supplemented by additional bus stands off Eversholt Street. An extended linear bus station, as in the original scheme, will be constructed in Stage B1, allowing the unification of Euston Square Gardens in 2033.
- 3.3.14 As in the original scheme, construction of the station and approach works in CFA1, in both stages, will be based at a main construction compound on the National Temperance Hospital site, with construction offices in the Podium. Additional project offices are to be provided on the Royal Mail delivery office satellite compound. An additional satellite compound, Park Village East (north), will be required to support the reinstatement of Line X, as well as elements of the retaining wall and tunnel portal works.

- 3.3.15 The remaining satellite compounds around the station and approach will be much the same as those in the original scheme, although there will be additional satellite compounds immediately south of the high speed station during construction Stage B1, to provide support to local elements of the construction. The positions of site compounds at the front of the station will also be slightly different from the original scheme, taking account of changes in the construction phasing.
- 3.3.16 The main construction traffic access to the Stage A works will be via the National Temperance Hospital entrance, but with substantial use of the Carriage Shed and Park Village East satellite compound and the Park Village East (north) satellite compound. For construction Stage B1, the National Temperance Hospital main compound will change in size, extending onto the completed deck north of the high speed station and reducing the original National Temperance Hospital footprint, with a new access to Hampstead Road. None of the construction compounds north of Granby Terrace Bridge required for construction Stage A, will be needed during construction Stage B1. The revised scheme includes the construction of replacement parking at the Zoological Society of London (ZSL) London Zoo, to allow an existing car park to be used as a lorry holding area, at various times throughout the construction period.
- 3.3.17 The revised scheme involves the same residential and other demolitions as in the original scheme, with the addition of one building, Granby House, off Harrington Street, which contains five dwellings and has been built since the main ES.
- 3.3.18 Since the Bill submission, DfT has made agreements with LBC that will secure the replacement of 136 social rented housing units that need to be demolished on the Regent's Park Estate and in Cobourg Street. It is understood that LBC also proposes to provide some shared equity housing in these developments for resident leaseholders displaced from the demolished properties owned by LBC.
- 3.3.19 It is intended that the replacement social housing, 66 homes on the Regent's Park Estate and 70 at the Netley Primary School, will be available for phased occupation by the end of 2017.
- 3.3.20 In June 2015, LBC made a planning application for 116 housing units on sites within the Regent's Park Estate. On Hampstead Road, where two of the replacement housing blocks are proposed, the revised scheme has been designed to take these into account.
- 3.3.21 The permanent loss of open space in the revised scheme is the same amount as in the original scheme, while the intended replacement will be an improvement over the original scheme. An additional area of open space will be provided in the revised scheme at the northern station entrance and improvements will be made to existing open spaces in the Amphill Estate. The staged construction requirements for the revised scheme mean that the full reinstatement of Euston Square Gardens can only take place in 2033.
- 3.3.22 Permanent road and pedestrian path closures for the revised scheme will be the same roads and paths as in the original scheme.
- 3.3.23 The revised scheme has taken account of further information obtained by HS2 Ltd on utility diversions, and includes, where appropriate, the additional capacity to support OSD, where future utility works for OSD might otherwise affect the operation of the

high speed railway. In the revised scheme, there will be utility works in one additional street, the southern part of Stanhope Street and one additional temporary road closure, in Mornington Crescent.

- 3.3.24 The overall construction programme for the revised scheme has had to be extended to 2033, although the works after 2026 will all take place to the south of Hampstead Road Bridge and most will be undertaken between the western side of the high speed station completed in Stage A and the conventional station.
- 3.3.25 Although not located in CFA1, the revised scheme design and assessment has taken account of the decision not to proceed with the HS1-HS2 Link, through Camden Town. The effects of this are reported in SES2 and AP3 CFA2, 3 and 4 Volume 2 reports.

3.4 Summary of operational changes

- 3.4.1 The revised scheme is to be delivered in two stages. However, the anticipated operation of high speed services into Euston will remain as reported in Volume 1 of the main ES for CFA1. Although the HS1-HS2 Link will now not be built, no change has been made to the assumption that, from 2026, with HS2 Phase One, up to 14 high speed trains per hour (tph) will serve Euston and after 2033, with HS2 Phase Two, there will be up to 18 high speed tph.
- 3.4.2 In the revised scheme, as noted in Section 3.3, there will be the staged provision of station facilities at Euston, including taxis and other surface access arrangements. These have been designed to meet the needs of both high speed and conventional rail passengers, at each stage, and to meet the needs of other users, for example, of the London Underground (LU).
- 3.4.3 The impacts of this staged provision, where this is relevant, are assessed in each of the topic sections in Part 1B, sections 6 to 16.

4 Summary of changes to likely residual significant effects

4.1 Introduction

- 4.1.1 This section reports and compares the likely significant residual effects reported for the original scheme in the CFA1 Volume 2 report in the main ES and those now reported for the revised scheme in SES2 (Part 1B) in this report. References to the main ES in this section are to the CFA1 Volume 2 report. Where a new or different significant effect is noted, this relates to the revised scheme when compared with the original scheme. Details of the likely significant residual effects of the revised scheme are set out in the relevant topic chapters in Part 1B.

4.2 Agriculture, forestry and soils

- 4.2.1 This environmental topic has been scoped out of the assessment for CFA1 as there are no agricultural or forestry activities affected by the original scheme or the revised scheme in this urban area.

4.3 Air quality

- 4.3.1 The air quality assessment reports the impacts and likely significant effects on air quality arising from the construction and operation of the scheme, covering nitrogen dioxide (NO₂), fine particulate matter¹¹ (PM₁₀) and dust.
- 4.3.2 In relation to construction dust, the revised scheme does not substantially change the nature or extent of construction activities nor are the location of relevant receptors sufficiently altered from those in the original scheme. As with the original scheme, no significant effects arising from dust emissions are anticipated.
- 4.3.3 Since the assessment of the original scheme, the baseline road traffic model has been updated and assignment of construction traffic to the road network has changed. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have also issued new guidance¹² on assessing the air quality impact of new developments. This guidance introduces a new set of impact descriptors and a framework for assessing the significance of effects. The main difference from the previous guidance is that it treats a similar increase in ambient pollutant concentrations as having greater impact and therefore having a greater potential for significant effect, especially where receptors experience baseline concentrations of NO₂ above the air quality standard of 40 µg/m³, as is the case here.
- 4.3.4 The revised scheme gives rise to a different distribution of construction traffic and baseline traffic over time from that reported for the original scheme, as a result of the changed construction programme and changes to the CLoHAM traffic model.
- 4.3.5 For the reasons set out above, the assessment of the original scheme and the revised scheme cannot be easily compared. The assessment of traffic emissions in relation to the revised scheme does report new and different significant effects from those reported for the original scheme, but in many cases, these arise from the changes in methodology and are not indicative that the changes in pollutants will be higher than those set out in the main ES.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.3.6 The main ES reported that the methods for controlling and managing dust emissions from construction outlined in the draft CoCP were likely to be effective and there would be no significant residual effects from dust emissions. The assessment of the revised scheme has applied updated guidance on controlling construction dust. The conclusion is that there will be no significant residual effects during construction Stage A.
- 4.3.7 The main ES reported that additional traffic from construction activity and changes in traffic flows caused by diversions would have significant effects, both beneficial and adverse. In the main ES, receptors on six streets are identified where, for NO₂, there will be significant beneficial effects. Significant adverse NO₂ effects were reported for

¹¹ PM₁₀ describes a size fraction of airborne particles that can be inhaled and therefore are of concern for human health. The designation refers to particles of size less than 10 micrometres in diameter.

¹² Moorcroft and Barrowcliffe et al., (2015), Land-Use Planning & Development Control: Planning for Air Quality. London: Institute of Air Quality Management.

assessed receptors on 20 streets. Significant adverse effects from PM₁₀ were identified for assessed receptors on four streets.

- 4.3.8 The assessment of the revised scheme has identified significant beneficial effects for NO₂ at assessed receptors on eight streets, significant adverse effects for NO₂ at assessed receptors along 39 streets and significant adverse effects from PM₁₀ at assessed receptors on five streets.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.3.9 For the original scheme, all construction was to be completed by 2026 and no effects from construction were, therefore, reported after 2026. The assessment of dust emissions for the revised scheme concluded that there would be no significant residual effects during construction Stage B1.
- 4.3.10 The main ES reported, based on an assessment of operational traffic only, that the original scheme in 2026 would have had significant beneficial effects for NO₂ at assessed receptors on two streets and significant adverse effects for NO₂ at assessed receptors on three streets. No significant effects were predicted for PM₁₀.
- 4.3.11 The assessment of the revised scheme has identified that changes in traffic as a result of combined construction and operation will have significant beneficial effects for NO₂ at assessed receptors on six streets and significant adverse effects for NO₂ at assessed receptors on nine streets. No significant effects are predicted for PM₁₀.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.3.12 Permanent effects arising only from the operation of the revised scheme have not been isolated from the construction effects in the scenario modelled for the post-2026 period. No likely residual significant effects from operation alone in 2033 can, therefore, be identified, but they would be substantially lower than those reported for Stage B1 construction and operation. This is because the construction effects on traffic emissions dominate over operational effects in this scenario and also, by 2033, both the baseline concentrations at receptors and vehicle emissions will be lower.

4.4 Community

- 4.4.1 The community assessment describes the predicted impacts on residential properties, community resources and open space resulting from land required to build the scheme, the change in the amenity of users or residents and the potential for the scheme to isolate properties or resources.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.4.2 The original scheme reported that there would be a major adverse significant effect due to the demolition of 215 residential properties, including 168 owned by LBC on the Regent's Park Estate. Neighbouring residents not affected by demolitions would experience a change in their amenity. Also in Regent's Park Estate, the construction of the original scheme would permanently require land occupied by Hampstead Road open space and Eskdale Play area. St James's Gardens would have also been required

permanently, although the facilities were to be reprovided elsewhere following construction. Land occupied by the Old Tenants Hall is required and this facility will be reprovided although the Silverdale Motorcycle Project, which was operated from the hall, is not being reprovided.

- 4.4.3 Since the main ES, an additional five dwellings have been built, at Granby House, which will need to be demolished for the revised scheme. Agreements have, however, also been made by DfT with LBC to enable the provision of replacement housing for all of the social housing tenants and, potentially, for some of the leaseholders who will be displaced from LBC housing. This replacement housing will substantially offset the impact, although a significant adverse effect from the loss of housing in this community will still arise from the revised scheme.
- 4.4.4 Immediately to the west of Euston station the revised scheme will result in the demolition of residential properties on Cobourg Street, Euston Street and Melton Street and the University College London (UCL) premises at Wolfson House all of which are the same as the original scheme. The amenity of residents at the remaining properties at the corner of Cobourg Street and Starcross Street is predicted to be affected by nearby construction activity. In the revised scheme, residents in Varndell Street and Robert Street and the users of a dental surgery, in Robert Street, will also experience amenity effects associated with an increase in road traffic.
- 4.4.5 The original scheme and the revised scheme will affect the playground adjacent to Lancing Street temporarily. Euston Square Gardens will not be able to be used as an open space throughout construction Stages A and B1. To the north of Euston station, residents at Park Village East are likely to experience temporary isolation and amenity effects. Temporary amenity effects are also expected to affect residents of the Ampthill Square Estate. The original scheme also affected the amenity of residents in St Richard's House and other properties in Eversholt Street, but this effect no longer arises in the revised scheme.
- 4.4.6 The construction of both the original scheme and the revised scheme give rise to changes in the amenity of residents as a result of changes in road traffic across a wider road network. In the main ES, these were reported to affect sections of A41 Wellington Road and A5205 St John's Wood Road. Traffic changes in the revised scheme create a wider set of amenity effects. These are predicted to affect residents along several roads, including A4201 Albany Street, A501 Euston Road (Euston Circus slip), A41 Baker Street (Park Road to Marylebone Circus) and A41 Park Road (junction with A5025 to junction with Rossmore Road), Bidborough Street, Mabledon Place (near Bidborough Street), Cartwright Gardens, A400 Gower Street/Bloomsbury Street (Euston Road to Torrington Place), Grafton Way and Coram Street. These temporary effects occur where increases in HGV movements coincide with significant air quality effects. These effects are predicted to occur at peak periods of activity during construction and do not necessarily occur simultaneously.
- 4.4.7 In the revised scheme, in addition to the receptors affected above, the amenity of residents at Mornington Terrace, Mornington Crescent, Mornington Place, Albert Street, Plender Street, Parkway and Delancey Street will also be temporarily affected.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.4.8 The temporary effects reported for construction Stage A do not continue in construction Stage B1. The exception to this is the temporary loss of Euston Square Gardens, which will continue until the end of Stage B1. This is an adverse effect which is significant.
- 4.4.9 During operation, in both the original and the revised schemes, the amenity of approximately 50 to 60 residential properties at Coniston, Langdale and Augustus House on the Regent’s Park Estate will be affected permanently by views of the completed scheme and traffic noise on Hampstead Road, arising from operation.

Summary of key changes in likely residual significant effects in full operation (2033 onwards)

- 4.4.10 The operational effects reported above for both the original scheme and the revised scheme after 2026 will persist and will be permanent.

4.5 Cultural heritage

- 4.5.1 The cultural heritage assessment describes the current baseline for heritage assets and reports the likely impacts and significant effects as a result of the construction and operation of the scheme. It considers the extent and heritage value (significance) of designated and non-designated assets. Impacts on assets as a result of the revised scheme will occur largely through the physical removal and alteration of assets and changes to their setting.
- 4.5.2 Since the nature and extent of works to be undertaken for the revised scheme are similar to the original scheme and there are only small additional land requirements, the differences in effects that may arise result from the staged construction programme, which alters the timing of certain impacts on historic assets or extends the period between the removal and relocation of some assets. Where assets are to be lost, both the original and revised scheme provide for investigation, recording and archiving of those asset records.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.5.3 The main ES reported that significant major adverse effects would arise from the permanent loss of St James’s Gardens due to the construction of the original scheme. The gardens contain the post-medieval St James’s burial ground and chapel.
- 4.5.4 The original scheme will result in significant major adverse effects from the permanent loss of a number of built heritage assets including 14-15 Melton Street (Grade II listed buildings, EUSo27¹³), the western side of the Parkway Tunnel (Grade II listed building, EUSo37), Euston station (EUSo05), the 1 and 3 Cobourg Street former stables (EUSo29), the former Euston underground station on Melton Street (EUSo27), Granby Terrace carriage shed (EUSo38), Mornington Street Bridge (EUSo17), the

¹³ Cultural heritage assets are identified with a unique reference code, EUSxxx. Further detail on these assets can be found in the gazetteer in Volume 5 of the main ES, Appendix CH-001-003

Euston railway cutting retaining wall and parapet at Park Village East (EUSo36), the late 19th/early 20th century National Temperance Hospital and the former print works (EUSo44).

- 4.5.5 The main ES reported that the original scheme will alter the setting of several built heritage assets around Euston, including, temporarily, the Grade II* listed buildings in Park Village East (EUSo03) during construction, and permanently, the Grade II* listed buildings at 1-9 Melton Street (EUSo30). A number of listed buildings including the Southampton monument and Christie monument in St James's Gardens (EUSo14), and the war memorial in Euston Square Gardens (EUSo42) will be relocated, significantly altering their setting.
- 4.5.6 In the revised scheme, the residual significant effects reported are slightly different. This is principally because three historic assets have been separated from the asset groupings reported in the main ES. Although this changes the reporting, the effects on these historic assets in the revised scheme are essentially the same as for the original scheme.
- 4.5.7 The War Memorial formed part of the asset grouping for Euston Square Gardens (EUSo04) in the main ES. Since the main ES, this asset has been upgraded by Historic England from a Grade II to a Grade II* listed building and a high value asset. A new asset reference, War Memorial in Euston Square Gardens (EUSo42), has been used to report the change in grade. In the revised scheme, there will be a significant major adverse effect resulting from the removal of the asset during construction Stage A, although it is to be relocated in Euston Square Gardens at the conclusion of construction in 2033.
- 4.5.8 The National Temperance Hospital (EUSo43) and the Thistle Hotel former print works (EUSo44) were identified in the main ES as part of the St James's Gardens asset grouping (EUSo14). In the revised scheme, these assets have been separated from this asset grouping to report the effects of their demolition, separately from the memorials in St James's Gardens, which are to be relocated. The demolition of the National Temperance Hospital will have a major adverse significant impact while the demolition of the Thistle Hotel is reported as a moderate adverse significant impact in the revised scheme.
- 4.5.9 For both the original scheme and the revised scheme, significant major adverse effects will arise from the permanent loss of St James's Gardens burial ground and the site of St James's Chapel (EUSo40), the Grade II 14-15 Melton Street (EUSo27), and the western side of the Parkway Tunnel and cutting (EUSo37). The loss of the London Square, Euston Square Gardens (EUSo04) will also result in a significant major adverse effect, which will persist for longer in the revised scheme. The setting of the Grade II* 1-9 Melton Street (EUSo30) will be permanently affected by the demolition of the adjoining 10 Melton Street. This will constitute a medium impact and a significant major adverse effect.
- 4.5.10 For both the original and the revised scheme, significant moderate adverse effects will arise from the permanent loss of the 1 and 3 Cobourg Street former stables (EUSo29), the former Euston underground station on Melton Street (EUSo28), Granby Terrace carriage shed (EUSo38), the Mornington Street Bridge (EUSo17), Mornington Terrace retaining wall parapet (EUSo36) and partial demolition of Euston station, the station

power signal box, One Euston Square and Grant Thornton House (EUS005). The removal and relocation of the Grade II listed Southampton Monument and Christie Monument in St James's Gardens (EUS014) will also result in a significant moderate adverse effect.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.5.11 For the original scheme, all construction would be completed by 2026 and no effects from construction were, therefore, reported in the main ES for the period 2026 - 2033. The staged construction of the revised scheme has changed the duration of significant residual impacts reported for the original scheme. During Stage B1, there will be a permanent significant moderate adverse effect resulting from the relocation of the Grade II* War Memorial in Euston Square Gardens (EUS042); the reconfiguration of the London Square, Euston Square Gardens (EUS004) and the partial demolition of a further part of Euston station (EUS005).
- 4.5.12 No physical impacts on heritage assets will arise during operation of either the original or the revised scheme and there will be no likely significant residual effects on the setting of historic assets during Stage B1.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.5.13 For the revised scheme, no physical impacts on heritage assets will arise during operation and there will be no likely significant residual effects on the setting of historic assets during operation.

4.6 Ecology

- 4.6.1 The ecology assessment sets out the ecological baseline and identifies likely impacts and significant ecological effects that will arise from the construction and operation of the scheme. These include impacts on species, habitats and sites designated for their importance for nature conservation.
- 4.6.2 There are two Local Wildlife Sites (LWSs) that will be affected by both the original scheme and the revised scheme: St James's Gardens Site of Local Importance (SLI) and the Regent's Park Site of Metropolitan Importance (SMI). The revised scheme will affect a larger, 1.3ha area of the Regent's Park SMI which will be used for replacement parking, while the ZSL London Zoo parking is used for lorry holding during construction.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.6.3 The main ES reported that the mitigation, compensation and enhancement measures described which would be in place by 2026, reduce the effects of the original scheme during construction to a level that is not significant. Although not all of the mitigation measures will have been completed for the revised scheme by the end of construction Stage A, the key measures will be in place as explained in 10.4.13. Hence the conclusion is unchanged for the revised scheme.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.6.4 For the original scheme, all construction would be complete by 2026. In the revised scheme, there will be no new impacts on ecological resources arising from Stage B1 construction. The remaining mitigation, including reinstating Euston Square Gardens and the habitat lost as a result of the replacement parking area in Regent’s Park, will be completed by 2033.
- 4.6.5 The main ES reported that there would be no residual significant effects during operation of the original scheme and this is the case for the revised scheme.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.6.6 For the revised scheme, there will be no residual significant effects during operation. This is unchanged from the conclusion in the main ES.

4.7 Land quality

- 4.7.1 The land quality assessment summarises the baseline conditions within and around the route and identifies the likely significant effects that will arise during the construction and operation. Potentially contaminated areas of land have been identified that could affect, or be affected by, the construction of the revised scheme.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.7.2 The revised scheme has assessed the same 21 areas taken forward for further land quality assessment as for the original scheme. Construction of the revised scheme includes retaining walls and large scale below-ground works to create a basement beneath the high speed station and the construction of either contiguous bored pile retaining walls or barrette walls in the station approach. This creates opportunities for new potential pollutant linkages.
- 4.7.3 The potential penetration of the Chalk formation in particular has required the risk assessment for these areas to be revised and updated.
- 4.7.4 No significant adverse effects were identified during construction of the original scheme, and significant beneficial effects associated with the remediation of pockets of former industrial land were reported in the main ES. This conclusion is unchanged for construction Stage A in the revised scheme.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.7.5 For the assessment during Stage B1, only 16 areas were taken forward to further assessment. During Stage B1, construction of the revised scheme will include additional LU infrastructure and the eastern retaining wall for the high speed station. Retaining walls beneath the high speed station will provide foundation support to the new high speed station buildings and form the primary structure for the LU ticket halls, passageways and underground station roof.

- 4.7.6 Where construction involves the installation of deep foundations, such as tension piles and barrette retaining walls, some of these will extend down into the Thanet Sand Formation and potentially down into the Chalk. The potential penetration of the Chalk formation has required the risk assessment for these areas to be revised and updated.
- 4.7.7 The main ES reported that risks to groundwater quality in the lower aquifers from piling works would be managed in accordance with the draft CoCP and good practice, including the Environment Agency guidance on piling and penetrative ground improvement. The assessment of the revised scheme confirms that there will be no significant residual effects during construction Stage B1.
- 4.7.8 The main ES reported that there may be the potential for minor leakage of hydraulic or lubricating oils from an auto-transformer station, adjacent to the tunnel portal, which will be operational from 2026. An auto-transformer station can, in principle, be a source of contamination. However, the proposed auto-transformer station will use secondary containment appropriate to the level of risk.
- 4.7.9 The assessment of the revised scheme concluded that there will be no significant residual effects during operation in Stage B1.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.7.10 The assessment of the revised scheme confirms that there will be no significant residual effects during operation.

4.8 Landscape and visual assessment

- 4.8.1 The landscape and visual assessment summarises the baseline conditions within and around the route and identifies the likely significant effects that will arise during the construction and operation on landscape character areas (LCA) and visual receptors.
- 4.8.2 The assessment examines the temporary effects during construction including those arising from the presence of construction plant and compounds, demolitions, new building and the removal of trees. The operational assessment refers not just to the running of the trains but also the presence of the new permanent infrastructure associated with the revised scheme.
- 4.8.3 The assessment of the original scheme was based on the intended construction of a 'freestanding station'. The revised scheme entails the staged construction of a high speed station, over a longer period, that creates opportunities for OSD above the station and parts of the approach. The assessment does report some new or different significant effects from those reported from the original scheme.
- 4.8.4 Comparison of the significant effects on LCAs between the original scheme and the revised scheme (where such a comparison is possible) identifies a major adverse effect on the same two LCAs in both schemes (Euston Road Commercial Area LCA and Euston West Post-War Residential LCA) in construction Stage A (2017 to 2026) with an additional moderate adverse significant effect also being reported for the revised scheme on the Regent's Park Georgian Residential LCA. In Stage B1 (2026 to 2033 or year 1 of operation for the main ES), both schemes report adverse significant effects on the Euston Road Commercial Area LCA and Euston West Post-War Residential

LCA. However, whilst the level of significance was moderate adverse for both LCAs in the main ES, there is a major adverse significant effect on the Euston Road Commercial Area LCA in the revised scheme between 2026 and 2033 due to the ongoing construction activities associated with Stage B1 construction. Following completion of Stage B1 construction in 2033, the operational assessment of the revised scheme reports a moderate adverse effect on both of the LCA, as in the main ES.

4.8.5 Where comparison is possible between the original scheme and the revised scheme, the differences in the total number and level of significant effects on viewpoints, taking account of the corrections included in Section 2.3, can be summarised as follows:

- Stage A construction (2017-2026);
 - original scheme – 28 significant effects (13 major adverse and 15 moderate adverse); and
 - revised scheme – 30 significant effects (14 major adverse and 16 moderate adverse); and
- Stage B1 construction and operation (2026-2033);
 - original scheme (no equivalent – year one of operation quoted) – 13 significant effects (three major adverse and 10 moderate adverse); and
 - revised scheme – 20 significant effects (five major adverse and 15 moderate adverse); and
- Operation (2033)
 - original scheme (no equivalent – year 15 of operation quoted) – eight significant effects (three major adverse and five moderate adverse); and
 - revised scheme – year 1 – 12 significant effects (four major adverse and eight moderate adverse).

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

4.8.6 The main ES reported major adverse significant landscape effects on two LCAs and moderate adverse effects on one LCA during construction. The revised scheme will extend across approximately the same extent of each LCA as the original scheme, will involve similar types of construction activities and will result in the same levels of significant effects on the same LCAs.

4.8.7 The main ES reported major adverse significant visual effects at 13 viewpoints and moderate adverse effects at 15 viewpoints. The revised scheme will result in major adverse significant visual effects at 14 viewpoints and moderate adverse effects at 16 viewpoints. The additional viewpoints affected are due to the addition of new assessment viewpoints for the SES2 and AP3 ES. These effects will be temporary in nature lasting only for the duration of the construction works.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.8.8 For the original scheme, all construction would be completed by 2026 and consequently no effects from construction were reported post-2026 in the main ES.
- 4.8.9 The main ES reported moderate adverse significant landscape effects during operation on two LCAs in Year 1 of operation, defined as 2026. The revised scheme will affect the same two LCAs during Stage B1 construction and operation. It will result in a moderate adverse significant landscape effect on one LCA and a major adverse effect on the other due to the continuance of construction activity and associated operation of the main and satellite compounds to the north, west, south and southwest of the new high speed station.
- 4.8.10 The main ES reported major adverse significant visual effects at three viewpoints in year 1 of operation and moderate adverse effects at 10 viewpoints.
- 4.8.11 The revised scheme in Stage B1 will result in major adverse significant visual effects at five viewpoints and moderate adverse effects at 15 viewpoints. The greater number of adversely affected viewpoints compared to the original scheme is due to the addition of one new assessment viewpoint for the SES2 and AP3 ES and the continuation, beyond 2026, of construction activity and associated operation of the main and satellite compounds to the north, west, south and southwest of the new high speed station.
- 4.8.12 There will be 10 fewer significantly affected viewpoints identified for the Stage B1 works than the Stage A works. This is largely due to the completion of the works for the station approach, the western side of the new high speed station and the new bus stands and driver welfare building adjacent to Barnby Street. The effects of Stage B1 construction will be largely temporary in nature lasting only for the duration of the construction works.
- 4.8.13 Construction works will be completed in the station approach north of Granby Terrace Bridge by the end of Stage A, and the Stage B1 operational components of the revised scheme in this area will not change the level of significance of the effects on visual receptors adjacent to the station approach, as reported in the main ES.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.8.14 The main ES reported moderate adverse significant landscape effects during operation on two LCAs, in Year 1 of operation, which was defined as 2026. The revised scheme in Year 1, defined as 2033, will also result in moderate adverse significant landscape effects during operation on the same LCAs, with similar permanent changes to the landscape, including loss of the smaller scale street pattern on the western side of the conventional station and loss of high-rise residential buildings in the Regent's Park Estate.
- 4.8.15 The main ES reported major adverse significant visual effects at three viewpoints in Year 1 of operation, which remain until Year 15 (reduced to two by year 60) and moderate adverse effects at 10 viewpoints, which reduce to five by Year 15 (increasing

to six by Year 60, as major significant effects lessen to become moderate due to the increased maturity of the mitigation planting).

- 4.8.16 The revised scheme will result in major adverse significant visual effects at four viewpoints in year 1, remaining at four by Year 15 (and in Year 60) and moderate adverse effects at eight viewpoints, reducing to three by Year 15 (which remain in Year 60) due to increased maturity of the mitigation planting.

4.9 Socio-economics

- 4.9.1 The socio-economic assessment summarises the baseline conditions within and around the route and identifies the likely significant effects that will arise during construction and operation of the revised scheme on existing businesses and community organisations, local economies and planned growth and development.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.9.2 The main ES reported that the original scheme in this area would result in a direct impact on 93 business accommodation units, which together formed 17 defined resources. From an employment perspective, significant adverse residual socio-economic effects were reported in the main ES on eight socio-economic resources during the construction of the original scheme. The revised scheme will result in a direct impact on 55 business accommodation units within the area, which together form 17 defined resources.
- 4.9.3 As a consequence of the revised scheme, there will no longer be significant sound, noise and vibration and construction traffic effects along Eversholt Street. Consequently, the amenity effect of the original scheme on the Roj Café and Sandwich Bar, reported in the main ES, is removed and this business will no longer experience significant amenity effects.
- 4.9.4 In the main ES, it was estimated that land required for the construction of the original scheme would result in the displacement or possible loss of approximately 3,090 jobs within this area. In comparison, it is estimated that the revised scheme will result in the displacement or possible loss of a total of approximately 2,865 jobs within the Euston area. Overall therefore, the revised scheme will result in the net retention of 225 jobs compared to the original scheme.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.9.5 The main ES reported that the original scheme would result in a direct impact on 40 retail business premises within Euston station and on the station frontage/forecourt. These businesses were grouped as one socio-economic resource in the main ES. From an employment perspective, significant adverse residual socio-economic effects were reported in the main ES on this resource during the construction of the original scheme. The revised scheme will result in a direct impact on 14 businesses within Euston station. A fewer number of businesses are impacted compared to the main ES although the socio-economic resource (Retail premises within Euston station) would still experience significant residual effects on business activities and employment during Stage B1 construction.

- 4.9.6 New retail floor space provided within the original scheme was estimated to result in the net addition of approximately 45 jobs in the Euston area. In comparison, new retail floorspace provided as a result of the revised scheme is estimated to result in the net addition of a total of approximately 250 jobs. The revised scheme will result in the net addition of 210 jobs compared to the original scheme.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.9.7 No significant adverse socio-economics effects were assessed to arise during operation of the original scheme and this assessment remains unchanged for the revised scheme.

4.10 Sound, noise and vibration

- 4.10.1 The sound, noise and vibration assessment reports the impacts and likely significant effects arising from the construction and operation of the revised scheme, following the same methodology as the main ES. The main changes that arise are due to the extended construction programme and changes to the nature of the noise-generating works in some areas.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.10.2 The extended construction programme in the revised scheme leads to generally longer duration noise impacts at most noise sensitive receivers, except to the east of the station where impacts are reduced, for example, the noise levels that were forecast to be greater than the noise insulation threshold at St Richard's House in Eversholt Street for the original scheme are no longer expected for the revised scheme.
- 4.10.3 The effect of increased construction work north of the station in the revised scheme will increase the extent of impacts in the Ampthill Estate and it is forecast that Oxenholme, Calgarth, Brathay, Glenridding and Mickledore residential blocks are likely to qualify for noise insulation, which was not the case in the original scheme.
- 4.10.4 At the north end of the railway approach, the duration of noise impacts from the revised scheme will be increased over those for the original scheme, both during the daytime and at night. Additional work activity at track level near the tunnel portal at night will increase impacts so that, in the revised scheme, a further approximately 25 dwellings on Delancey Street are likely to qualify for noise insulation. Impacts at the northern end of Park Village East, including residential properties and Park Village Studio, are also predicted to be longer due to the additional need for construction vehicle access from the north and for construction plant to be placed on Park Village East for the reinstatement of Line X.
- 4.10.5 Taking the revised scheme as a whole, approximately 200 additional dwellings are likely to qualify for noise insulation, based on conservative noise modelling and performance of site mitigation measures that have been assumed for this assessment.
- 4.10.6 As in the main ES, it is expected that under the requirements of the draft CoCP, the contractors will, through the application of best practicable means (BPM), find

additional ways to reduce noise levels and vibration on site so that the extent of noise insulation and residual significant noise and vibration effects will be less than that reported at this stage.

Summary of key changes in likely residual significant effects in Stage B1 construction (2026–2033)

- 4.10.7 For the original scheme, all construction would have been completed by 2026 and no effects from construction were reported after 2026. For the revised scheme, the construction noise assessment is based on the modelling of construction activities through to 2033 and shows some impacts after 2026 in the area south of Hampstead Road Bridge with increased total durations of impacts at most assessment locations. Noise insulation will generally be installed at qualifying properties before any relevant works in the affected areas begin and is expected to mitigate construction noise throughout the remaining construction period to 2033.

Summary of key changes in likely residual significant effects arising during operation (2033 onwards)

- 4.10.8 In the revised scheme, the high speed rail alignment, the Hampstead Road alignment and the envisaged mitigation measures are not materially changed from the original scheme, and the direct noise significant effects for the revised scheme remain as reported in the main ES, taking account of the corrections included in Section 2.3.
- 4.10.9 Changes to the forecast road traffic flows as a result of the revised scheme have changed the local roads around the station on which indirect beneficial and adverse significant noise effects are likely.
- 4.10.10 In the revised scheme, approximately 70 dwellings in Cartmel, Hampstead Road remain likely to qualify for noise insulation.
- 4.10.11 The significant effect around Langdale, Augustus House and Coniston in the Regent's Park Estate, resulting from airborne noise increases principally due to the realignment of Hampstead Road, remains unchanged from that reported in the main ES.
- 4.10.12 Changes in the forecast road traffic as a result of the revised scheme mean that significant beneficial noise effects reported for the original scheme are no longer likely around residential dwellings on Drummond Street, Robert Street and Varndell Street; however a new significant beneficial noise effect is likely around dwellings on Cardigan Street.
- 4.10.13 The changed traffic flows as a result of the revised scheme remove the significant adverse noise effects reported for the original scheme around dwellings along North Gower Street, Stanhope Street Mornington Street and Arlington Street. A new significant adverse noise effect from increased traffic is likely around dwellings on Cobourg Street and a section of Euston Street between Stephenson Way and Cobourg Street.

4.11 Traffic and transport

- 4.11.1 The transport assessment reports the likely impacts on all forms of transport and the consequential effects on transport users arising from the construction and operation of the revised scheme within the Euston station and the station approach area.

- 4.11.2 These include National Rail and LU services, buses, walking, cycling, taxi and private vehicle pick up/set down movements and increased traffic as a result of implementation of the revised scheme, road diversions, temporary and permanent road closures, and temporary and permanent diversions or closure of paths used by the public (treated in the same way as public rights of way (PRoW) for the purposes of the ES).
- 4.11.3 Since the assessment of the original scheme, the baseline road and public transport models have been updated and assignment of construction traffic to the road network has changed. TfL's LTS and Railplan models have been updated with Railplan updated from a 2007 to a 2011 base and the CLoHAM highway model also updated. The updated CLoHAM model includes an updated list of reference case schemes than assumed in the main ES.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.11.4 The main ES reported that three bus routes would be affected during construction. The assessment of the revised scheme has identified eight bus routes that would be affected during construction Stage A.
- 4.11.5 The main ES reported changes in traffic flows on a number of roads resulting from construction traffic, local road closures and relocation of taxi operations on roads. These changes were concentrated on roads to the east of Euston in the Somers Town and King's Cross area, particularly around the A4200 Eversholt Street; on the A501 Euston Road between Gordon Street and King's Cross; to the south in the Bloomsbury area resulting from the closure of Gordon Street particularly A400 Gower Street and B504 Judd Street; in the Regent's Park and Camden Town areas on roads around A4201 Parkway; and on the A41 and other construction lorry routes. The revised scheme affects very similar locations with some further effects identified. The revised scheme affects more roads, largely as a result of more detailed networks in the updated CLoHAM model. In addition, some further roads are affected by the temporary closure of Prince Albert Road at its junction with A4201 Parkway in 2017.
- 4.11.6 Taking account of the corrections included in Section 2.3, the main ES reported impacts on heavily used parking and loading facilities arising from construction of the revised scheme at the following locations: Robert Street; Stanhope Street; Mackworth Street; Varndell Street; Harrington Street; Granby Terrace, Park Village East; Mornington Terrace; Starcross Street; Lancing Street; Stephenson Way; A4200 Eversholt Street; Drummond Crescent; and the Ampthill Estate. The revised scheme affects very similar roads to those reported in the main ES although there are new effects reported for the revised scheme on A400 Hampstead Road due to the form of the bridge.
- 4.11.7 The main ES reported that passengers would be affected by proposed platform closures of the southbound Northern line (Bank branch) platform and the Victoria line and Northern line (Bank branch) northbound platforms. These effects are also reported for the revised scheme.
- 4.11.8 The main ES reported that construction activities would result in disruption to passengers at Euston station as a result of relocation of the station taxi facilities to

A4200 Eversholt Street and the need to divert passenger routes at the station. This effect is reported for the revised scheme with a new residual effect as a result of also moving the taxi facility to Euston Square Gardens.

- 4.11.9 The main ES reported that the most intensive peak periods of construction would have significant effects on pedestrians and cyclists. The locations of these effects are unchanged in the revised scheme.
- 4.11.10 The main ES reported a potential increase in accident and safety risks at A501 Euston Road (between Churchway and Dukes Road); A501 Euston Road/A400 Tottenham Court Road; A501 Euston Road/A4200 Eversholt Street/Upper Woburn Place; A4200 Eversholt Street/Lidlington Place; A501 Euston Road/Pancras Road and A400 Hampstead Road/Drummond Street. The revised scheme has only identified a potential increase in accident and safety risks at Regent's Park, Outer Circle.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.11.11 For the revised scheme, a further assessment has been carried out for Stage B1 construction and operation (2026–2033). This was not reported in the main ES as the entire high speed station would have been completed in 2026.
- 4.11.12 A comparison of those effects identified in the main ES for 2026 operation of HS2 Phase One services, and for those identified with combined completion of Stage A of the revised scheme and operation of HS2 Phase One services at the end of 2026, are as follows.
- 4.11.13 The beneficial effects on rail passengers of opening of the first six high speed platforms and operating Phase One HS2 services at the end of 2026 are the same for the main ES and revised scheme.
- 4.11.14 Following the opening of the first six high speed platforms at the end of 2026, additional demand on the LU network will lead to delay on LU lines at Euston station. This effect is unchanged for the revised scheme.
- 4.11.15 The main ES reported beneficial effects for rail passengers of the revised scheme as a result of improved journey times on the high speed railway to the Midlands and beyond; lower crowding levels on trains to and from the conventional station as a result of increases in train frequencies; and released capacity on other rail services easing pressure on the WCML with resultant reliability benefits. These effects are the same with the revised scheme.
- 4.11.16 The effects from improvements in platform access as a result of improvements to Euston underground station; improved facilities and access to Euston Square underground station as a result of the provision of a new Gordon Street underground station entrance and subway connection; and increasing capacity for bus routes as a result of the additional bus stands off A4200 Eversholt Street are the same for the main ES and revised scheme. In addition, the main ES included the delivery of the linear bus station in 2026, which occurs in 2033 in the revised scheme.
- 4.11.17 The main ES reported that two bus routes would be affected by the opening of HS2 Phase One in 2026. The assessment of the revised scheme has identified eight bus

routes that would be affected by the completion of Stage A of the revised scheme at the end of 2026.

- 4.11.18 The main ES reported increases in traffic flows concentrated on some roads to the east of Euston station in the Somers Town and King's Cross area, to the immediate west of the station, as well as in the Regent's Park and Camden Town areas. In addition there will be increases in traffic on some roads to the south of the A501 Euston Road, in the Bloomsbury area. The revised scheme affects very similar locations with some further effects identified. The revised scheme affects more roads, largely as a result of more detailed networks in the updated CLoHAM model.
- 4.11.19 The main ES reported effects arising from the original scheme on parking and loading due to the permanent footprint of the high speed station. The revised scheme affects very similar roads to those reported in the main ES although new effects are reported on Granby Terrace Bridge.
- 4.11.20 The main ES reported that the most intensive peak periods of construction will have significant effects on pedestrians and cyclists. The location of these is unchanged in the revised scheme.
- 4.11.21 The main ES reported a potential increase in accident and safety risks at A501 Euston Road, A501 Euston Road/B504 Judd Street/Midland Street, A400 Hampstead Road/Robert Street, and A400 Hampstead Road/Drummond Street. The revised scheme has only identified a potential increase in accident and safety risks at A400 Hampstead Road/Robert Street junction.
- 4.11.22 The effects associated with Stage B1 construction of the revised scheme in addition to those due to operation of HS2 Phase One services alone, but not reported in the main ES, are set out below.
- 4.11.23 Works at Euston underground station will require the temporary simultaneous closure of the northbound and southbound Northern line (Charing Cross branch) platforms for a three month period in early 2032. For the main ES this was programmed to take place during construction prior to 2026.
- 4.11.24 The revised scheme will result in some additional impacts on heavily used parking and loading facilities associated with construction Stage B1 at the following locations: Robert Street, Stanhope Street, Mackworth Street, Harrington Street and the Ampthill Estate.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.11.25 The main ES reported the effects of the operation of the completed station with Phase Two services in 2041, which has also been assessed for the revised scheme.
- 4.11.26 The main ES reported that five bus routes would be affected. The assessment of the revised scheme has identified five different and new bus routes that would be affected in full operation.
- 4.11.27 The main ES reported beneficial effects for rail passengers of the original scheme as a result of improved journey times on the high speed railway to the Midlands and beyond; lower crowding levels on trains to and from the conventional station as a

result of increases in train frequencies; and released capacity on other rail services easing pressure on the WCML with resultant reliability benefits. These effects are the same with the revised scheme.

- 4.11.28 The main ES reported effects from improvements in platform access as a result of improvements to Euston underground station; improved facilities and access to Euston Square underground station as a result of the provision of a new underground station entrance at Gordon Street and subway connection; and increasing capacity for bus routes as a result of the improved linear bus station and additional bus stands off A4200 Eversholt Street are the same for the main ES and the revised scheme. In addition, the revised scheme introduces an additional entrance to the LU station.
- 4.11.29 The main ES reported that additional demand on the LU network in 2041 will lead to some increased crowding and consequential delay on LU lines in the Euston area, particularly on the Circle, Hammersmith & City and Metropolitan lines and Northern line (Charing Cross) branch. The revised scheme identifies increased crowding on the Circle, Hammersmith & City and Metropolitan line only.
- 4.11.30 The main ES reported increases in traffic flows in 2041 concentrated on some roads to the east of Euston station in the Somers Town and King's Cross area, to the immediate west of the station, as well as in the Regent's Park and Camden Town areas. In addition there will be increases in traffic on some roads to the south of the A501 Euston Road, in the Bloomsbury area. The revised scheme affects very similar locations with some further effects to the south of Gordon Street. The revised scheme affects more roads, largely as a result of more detailed networks in the updated CLoHAM model.
- 4.11.31 The main ES reported effects arising from the original scheme on parking and loading due to the permanent footprint of the high speed station. The revised scheme affects very similar roads to those reported in the main ES although new effects are reported on Granby Terrace Bridge.
- 4.11.32 The main ES reported that the most intensive peak periods of construction will have significant effects on pedestrians and cyclists. The locations of these are unchanged in the revised scheme.
- 4.11.33 The main ES reported a potential increase in accident and safety risks at A501 Euston Road, A501 Euston Road/B504 Judd Street/Midland Street, A400 Hampstead Road/Robert Street, A400 Hampstead Road/Drummond Street, A501 Euston Road/A400 Tottenham Court Road and A4201 Albany Street. The revised scheme has only identified a potential increase in accident and safety risks at A400 Hampstead Road/Robert Street junction and A400 Hampstead Road/Drummond Street.

4.12 Water resources and flood risk assessment

- 4.12.1 The water resources and flood risk assessment (FRA) reports the impacts and likely significant effects on water resources and flood risk arising from the construction and operation of the scheme, including impacts on groundwater, surface water and flood risk.
- 4.12.2 The nature and extent of works to be undertaken for the revised scheme are similar to the original scheme, but there are some changes to how these will be constructed.

The differences in impacts that could occur, result from the construction of the ancillary works for OSD, the LU station and the drainage arrangements, and changes to surface water flood risk.

Summary of key changes in likely residual significant effects in Stage A construction (2017–2026)

- 4.12.3 For both the original and revised scheme, after mitigation is applied, no significant impacts on water resources and flood risk will arise during construction Stage A and there will be no likely significant residual effects on water resources and flood risk during construction Stage A.

Summary of key changes in likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 4.12.4 For both the original and revised scheme, after mitigation is applied, no significant impacts on water resources and flood risk will arise during Stage B1 construction or operation and there will be no likely significant residual effects on water resources and flood risk during Stage B1 construction or during operation.

Summary of key changes in likely residual significant effects in operation (2033 onwards)

- 4.12.5 For both the original and revised scheme, after mitigation is applied, no significant impacts on water resources and flood risk will arise during operation and there will be no likely significant residual effects on water resources and flood risk.

Part 1B: SES2 – replacement Environmental Statement

5 Overview of the area and description of the revised scheme for Euston station and approach

5.1 Overview of the area

Introduction

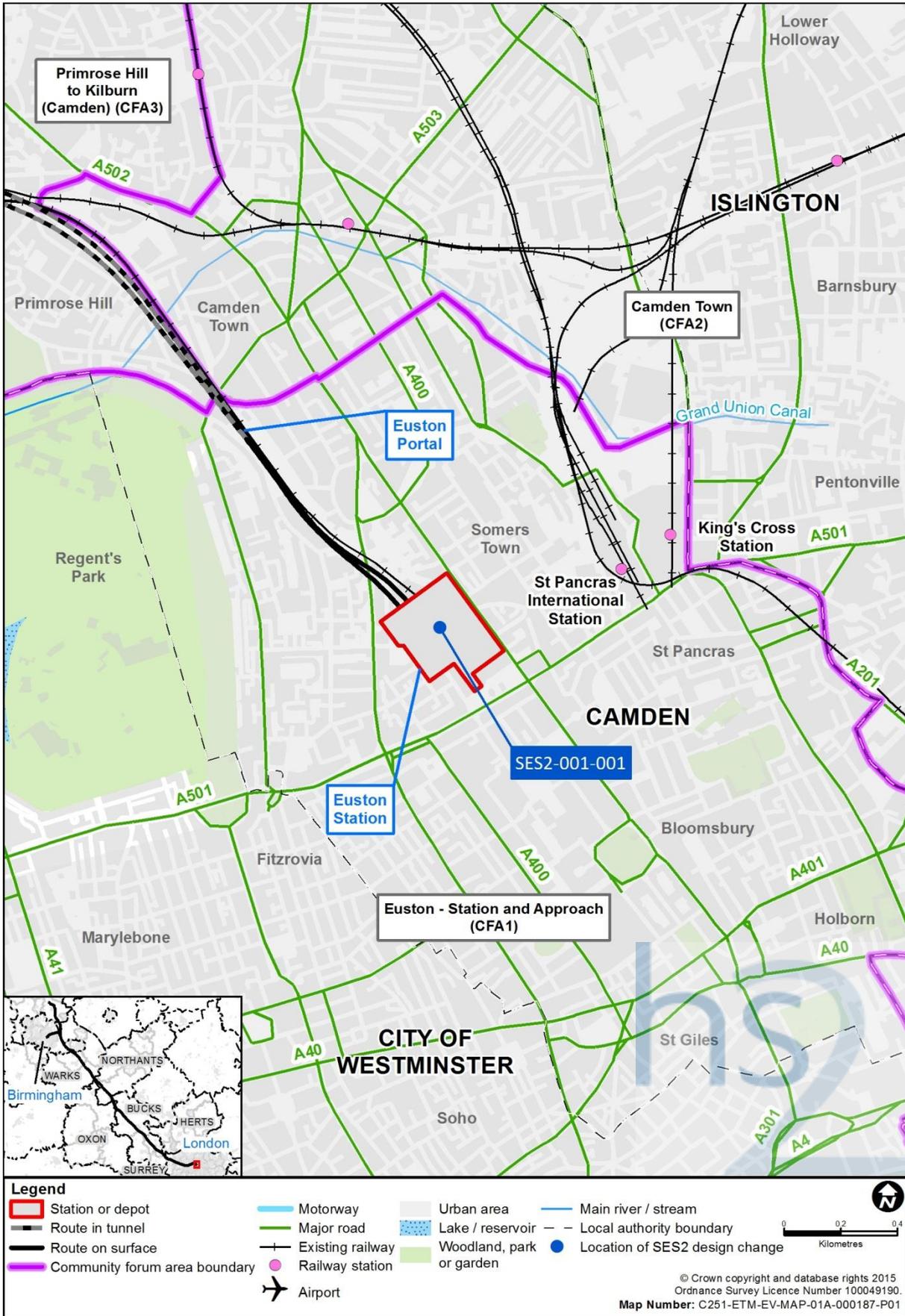
- 5.1.1 This part of the revised scheme (CFA1) comprises Euston station and a 1.3km section of the route from Euston station, north of the Euston Road to the Park Street Tunnels, where Parkway crosses the existing railway. This area is adjacent to Primrose Hill to Kilburn (Camden) (CFA3) to the immediate north-west and Camden Town (CFA2) to the north. It is entirely within LBC and shown on Figure 1.
- 5.1.2 The label SES2-001-001 indicates the location of the 'revised design of Euston station', within CFA1.

Land use

- 5.1.3 Euston station, the WCML, and associated operational and maintenance facilities are key elements of the urban environment in the area. The existing railway corridor runs north-west in a retained cutting from Euston station, through the districts of Somers Town to the east and Regent's Park to the west.
- 5.1.4 Eversholt Street bounds the east side of the existing station and has local shops, restaurants and public houses. To the west of the existing station, there is a mixed business and residential community including shops, restaurants and hotels around Drummond Street. Further north the Regent's Park district, between Hampstead Road and Albany Street, consists mainly of social housing, including the Regent's Park Estate. In the northern part of this area, adjacent to Regent's Park, there is Georgian housing on Park Village East and Park Village West.
- 5.1.5 To the east of the existing railway corridor, Somers Town is characterised by blocks of social housing including the high rise Ampthill Estate (also known as the Ampthill Square Estate) and the medium rise Churchway Estate. Further north, towards Camden Town, there is Georgian terraced housing, including on Mornington Terrace and Mornington Crescent.
- 5.1.6 The topography is relatively flat. However, there is a gentle rise of about 15m from Euston station to Parkway over a distance of approximately 1.3km.

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Figure 1: Area context map



Existing transport infrastructure

- 5.1.7 Euston station is a major transport interchange and a terminus for both intercity and local trains. The station is served by two LU lines. These are the Victoria line and the Northern line (both Charing Cross and Bank branches). Euston Square underground station, which is served by the Circle, Hammersmith & City and Metropolitan lines, is about 300m from Euston station, west along Euston Road. There is a bus station served by 12 bus routes at the front of the station, a taxi rank under the station, and cycle parking facilities adjacent to the station. Euston station also acts as a local centre with restaurants, cafes and shops.
- 5.1.8 The station faces towards A501 Euston Road, which is lined with offices, university buildings, hotels, the British Library, Camden Town Hall, University College London Hospital (UCLH) and other London mainline and underground stations (e.g. St Pancras International station and King's Cross St Pancras underground station, to the east). Euston station and the existing railway corridor form a physical barrier separating the communities to the east and west.
- 5.1.9 There are four pedestrian routes, which have been treated in the same way as PRow for environmental assessment purposes: a path leading from Hampstead Road through St James's Gardens; the pedestrian section of Harrington Street where it passes under Ainsdale (a residential block) on the Regent's Park Estate and two paths that cross Euston Square Gardens.
- 5.1.10 There are a number of London Cycle Network (LCN) routes on the streets around Euston. There are numerous cycle hire docking stations close to Euston station. Those closest to the revised scheme are on: Drummond Street; Doric Way; Endsleigh Gardens; Hampstead Road and Euston Road, close to its junction with Melton Street.

Socio-economic profile

- 5.1.11 To provide a socio-economic context for the area, data for the demographic character areas (DCAs) of: Regent's Park; Euston Square; Somers Town and Regent's Park Estate has been used¹⁴. In total, the population of the DCA is approximately 26,300. Unemployment at 12.0% is higher than the national level in England of 7.4%, while 54.9% of the population aged 16-74 is economically active compared to the national figure of 69.9%¹⁵. There are approximately 54,800 people who work within the area¹⁶.

Community facilities

- 5.1.12 There are a number of community facilities in the Euston area. There are numerous shops and services located throughout the area, with centres at Camden High Street, King's Cross station, St Pancras International station and the Brunswick Centre. These include a good range of retail services, including banks, cinemas and post offices. There are also smaller groups of shops, restaurants, public houses and other services, including those on Euston Road, Euston Street, Drummond Street and Eversholt Street. Euston station has shops and services that serve both passengers and the local community. Somers Town street market also serves the area around Euston station.

¹⁴ A DCA represents a community that, depending on the area, may consist of a local ward, neighbourhood or village(s).

¹⁵ Data comes from the 2011 Population Census.

¹⁶ Data comes from the 2011 business register and employment survey.

- 5.1.13 There are three early-years educational facilities, six primary schools and two secondary schools in the area, the nearest being Maria Fidelis Convent (Lower) School. UCL occupies many buildings in the area, the closest to Euston station being on Stephenson Way. UCL also has office space in the Podium and One Euston Square, both immediately south of the station, and at 132 to 140 Hampstead Road.
- 5.1.14 There are nine religious facilities and/or places of worship in the area which include St Aloysius' campus (with a convent, a church, two schools and a social club), St Pancras Church, the Friends House (incorporating the Quaker Centre), the Kingdom Hall of Jehovah's Witnesses and the Shahjalah Jame Mosque are located on North Gower Street.
- 5.1.15 There are four doctors' and five dentists' surgeries in the area around Euston station. UCLH is 250m from Euston station.

Recreation, leisure and open space

- 5.1.16 The British Library, The Dr Williams's Library (Congregational Library), The Wellcome Foundation, Regent's Park and the Petrie Museum are all located in close proximity to Euston station.
- 5.1.17 There are six community/youth centres in the Euston area. These include a community hall located on the Amptill Estate and The Old Tenants' Hall on Harrington Street which serves the Regent's Park Estate. These facilities provide venues for recreation and leisure activities. The Somers Town Community Sports Centre offers a wide range of recreational activities and is approximately 300m north from Euston station.
- 5.1.18 The principal open spaces adjacent to Euston station are Euston Square Gardens and St James's Gardens. Regent's Park lies approximately 200m west of the existing railway corridor at its closest point. There are local play spaces interspersed throughout the housing estates and community allotments located between Redhill Street and Augustus Street.
- 5.1.19 The ZSL London Zoo is located in Regent's Park, with the nearest part of the site approximately 200m west of the Euston portal.

Planning and policy context

Strategic and local planning policy for the Euston area

- 5.1.20 The revised scheme for Euston is in conformity with and supported by the strategic and local planning and transport policy frameworks.
- 5.1.21 This section provides further information on the relationship between the revised scheme and the strategic and local planning policies. This includes environmental designations and policies, where these are relevant to the environmental topics assessed in CFA1.
- 5.1.22 The principal regional and local policy documents for Euston comprise the London Plan 2011 and Further Alterations to the London Plan 2015, the Mayor's Transport Strategy, the LBC Local Development Framework (LDF), Camden's Transport Strategy and the adopted EAP.

- 5.1.23 The London Plan seeks to integrate transport and development throughout London, particularly at locations such as Euston, which already have high public transport accessibility. HS2 is a key scheme in the London Plan's Indicative List of Transport Schemes and is identified as a strategic priority which will "support future development and regeneration priority areas, and increase public transport capacity".
- 5.1.24 Euston is identified under Policy 2.13 of the London Plan as an 'opportunity area' with significant capacity to accommodate new housing, commercial and other development linked to existing or potential improvements to public transport accessibility. The opportunity area broadly covers the area now identified for development and regeneration within the EAP.
- 5.1.25 Annex 1 of the London Plan outlined the broad principles for the opportunity area's development, and estimated that the area has potential to provide for an additional 5,000 jobs and a minimum of 1,000 new homes in the period to 2031.
- 5.1.26 The Further Alterations to the London Plan 2015 has updated the capacity of the opportunity area to a minimum of 7,700 jobs and 2,800 new homes over the next 15 to 20 years, in line with the emerging EAP. Policy 6.4 has been amended to include Crossrail 2 in the list of key transport initiatives intended to be taken forward by the Mayor of London, although this is still at the planning stage.
- 5.1.27 The Mayor's Transport Strategy supports the development of a national high speed rail network. It seeks to ensure that the main London terminus for a high speed line is centrally located, well connected to the existing public transport network and widely accessible to maximise access to jobs and London's population. The Transport Strategy identifies Euston as being best placed to 'meet these criteria'.
- 5.1.28 The Mayor's Transport Strategy also sets out a transport vision for London and describes how TfL and partners, including the London boroughs, will deliver that vision. It identifies a number of overarching transport priorities that are relevant to the revised scheme:
- 5.1.29 Policy 2 sets out the Mayor's support for sustainable capacity enhancements to interregional, national and international rail and coach services, high speed rail hubs and the strategic road network serving London;
- Policy 4 seeks to improve people's access to jobs, business access to employment markets, and business to business access. The revised scheme will provide a sustainable means of access to jobs and business across the country, reducing the need for internal business air travel and business related road travel;
 - Policy 5 seeks to ensure efficient and effective access for people and goods in central London through providing improved central London connectivity and appropriate capacity. This will include improving access to major public transport interchanges such as Euston for pedestrians, cyclists and by public transport;
 - Policy 13 seeks to expand the capacity and quality of public transport services, improve passenger comfort and customer satisfaction, reduce crowding, and improve road user satisfaction. The revised scheme will improve Euston

station as a major terminal interchange and will increase capacity of rail journeys to ease overcrowding and capacity issues on other rail routes serving the Midlands and beyond; and

- Policy 24 seeks to deliver the required contribution from ground-based transport to achieve a 60% reduction in London's CO₂ emissions by 2025. The integrated development around Euston station will encourage the use of sustainable rail travel with public realm improvements supporting walking and the use of cycles to reduce the number of vehicle trips.

- 5.1.30 The vision statement in the LBC Adopted Core Strategy¹⁷, which forms part of the LDF, identifies Euston as an 'area of growth' and defines it as a special policy area. A strategic objective of the Core Strategy is to support the successful development of the Euston growth area and ensure that development is supported by necessary infrastructure. It is also identified as an area where major redevelopment is expected to occur in association with planned improvements to the station to relieve overcrowding.
- 5.1.31 The Euston 'growth area' is defined in the LBC Core Strategy (paragraph 31) as: land bounded by Hampstead Road to the west; Harrington Square to the north; Eversholt Street to the east; and Euston Road to the south. A strategic objective of the Core Strategy is to support the successful development of the Euston growth area and ensure that development is supported by necessary infrastructure (paragraph 32).
- 5.1.32 The LBC Core Strategy notes that the scope of change in the Euston growth area will 'depend on operational rail requirements, how station improvements are financed, the degree of station renewal, transport capacity, use of space over the station, strategic viewing corridors and other considerations'.
- 5.1.33 The LBC Adopted Site Allocations Plan 2013¹⁸, which also forms part of the LDF, seeks to ensure that the redevelopment of Euston station meets a number of objectives and addresses certain key issues. These include making significant improvements to the way in which the station relates to the surrounding area; the need to improve connections to and through the site; and the need to improve interchange and onward movement from the station. The provision of a mix of uses above a station development is supported, in order to make the most of its key central London location and to deliver the new homes and jobs in the Euston area set out in the London Plan 2011. The Site Allocations Plan recognised that the station development was likely to include an expanded station footprint to the west affecting potential development sites. There are three sites identified which fall within the footprint of the revised scheme, namely:
- Site 9: Euston station;
 - Site 10: Numbers 132 to 140 and number 142 Hampstead Road; and
 - Site 11: Granby Terrace depot.

¹⁷ London Borough of Camden, (2010), *Adopted Core Strategy*.

¹⁸ London Borough of Camden, (2013) *Adopted Site Allocations Local Development Document*.

- 5.1.34 The EAP, prepared by LBC, GLA and TfL, assisted by HS2 Ltd, was published as a consultation draft in July 2013. The original scheme at Euston took account of that draft EAP. The EAP, subject to public examination in July 2014 and adopted in January 2015, takes forward the objectives and aspirations for delivering a comprehensive transport and development framework for the Euston area, building on the London Plan 2011 and the other strategic policy documents. Following adoption, it has also become supplementary planning guidance (SPG) to the London Plan. It covers an area bounded by Albany Street, Euston Road, Phoenix Road, Chalton Street and Eversholt Street, as well the railway approach as far as Parkway. It includes the station; the Amptill Estate; the Regent's Park Estate to the west of Hampstead Road; and the southern side of Euston Road, between Gower Street in the west to Mabledon Place in the east.
- 5.1.35 The EAP sets 11 strategic objectives, which include, in particular:
- objective 3 – Making the best use of new space above the station and tracks and opportunities for regeneration in the wider area;
 - objective 4 – New streets above the tracks and station; and
 - objective 11 – Deliver a new world class Euston station and integrated development.
- 5.1.36 The development strategy in the EAP is promoting large scale development, much of which is intended to be over the high speed and conventional station and tracks. It establishes a range of development capacities, with the 'lower bound' being the nominal capacities set out in the London Plan Further Alterations 2015. The 'upper bound' provides for the net development of 3,800 dwellings, plus an allowance for replacing dwellings that would be lost as part of the station development; and up to 280,000m² of employment space, as well as 20,000m² of retail development. It also includes open space and social infrastructure, to serve the station and reinforce existing local facilities. It estimates that the commercial and other development could provide for up to 14,100 additional jobs.
- 5.1.37 The EAP land use strategy also proposes a grid of new east-west and north-south pedestrian streets routes across the station and approach. It identifies opportunities for OSD above the entire station, extending over parts of the high speed tracks and the existing railway as far as Parkway.
- 5.1.38 Since submission of the Bill, in consultation with key stakeholders, HS2 Ltd has undertaken a wide ranging review of the delivery of HS2 Phase One, including Euston, as recommended in the HS2 Plus report. HS2 Ltd, DfT and NR have been working with the other EAP partners to develop the revised scheme, in the light of the HS2 requirements and of the need to ensure adequate capacity for the conventional railway and station at Euston. The revised scheme has been designed to facilitate, as far as it can, the delivery of the 'upper bound' development capacities and transport requirements set out in the EAP. The timing of development will however have to take account of the staging of the construction of the revised scheme and future decisions about the potential redevelopment of the conventional station¹⁹.

¹⁹ The design of the revised scheme is intended to allow potential OSD over the conventional station, if it is redeveloped in the future by NR.

- 5.1.39 In the EAP, it is recognised that it is for Parliament to grant planning permission for the works in the Bill, including Euston station, and to determine the planning regime that should apply to the detailed design of the station. LBC (and the Mayor of London) will be the planning authorities for the consideration of any OSD, which will be dealt with under the normal local planning system and the impacts of OSD are not considered further in this assessment.
- 5.1.40 The Secretary of State, with HS2 Ltd and NR, will continue to work closely with LBC, the GLA and other stakeholders and landowners, to progress the delivery of the opportunities for development above and around the station that will be possible with the revised scheme.
- 5.1.41 LBC is currently reviewing its LDF and has consulted on a draft Local Plan²⁰, which will replace the LDF as the basis for planning decisions and future development after examination in 2016.
- 5.1.42 Other adopted local policies have been considered and referred to where appropriate in particular topic sections of this assessment. Apart from those already referred to, these include:
- LBC Adopted Fitzrovia Area Action Plan (2014)²¹;
 - LBC Adopted Development Management Policies (2010)²²;
 - Westminster City Council Adopted Unitary Development Plan, Saved Policies (2010)²³;
 - Westminster City Council Westminster's City Plan: Strategic Policies, November 2013²⁴;
 - London Borough of Islington Adopted Core Strategy (2011)²⁵;
 - London Borough of Islington Finsbury Local Plan (2013)²⁶;
 - London Borough of Islington Development Management Policies (2013)²⁷; and
 - London Borough of Islington Local Plan Site Allocations (2013)²⁸.
- 5.1.43 Planning and environmental designations
- 5.1.44 There are three conservation areas in close proximity to the revised scheme (see Map CT-10-001, Volume 2 SES2 and AP3, CFA1 Map Book): Bloomsbury; Regent's Park and Camden Town. Regent's Park Conservation Area is located adjacent to the west of the existing railway in this area, along Park Village East, and Camden Town Conservation Area is located to the east of the existing railway and it extends broadly from Granby Terrace Bridge to Parkway. Euston station is also crossed by the protected view from

²⁰ Camden Council (2015) *Draft Camden Local Plan*.

²¹ London Borough of Camden Adopted Fitzrovia Area Action Plan (2014).

²² London Borough of Camden, (2010), *London Borough of Camden Adopted Camden Development Policies 2010 – 2025*.

²³ Westminster City Council, (2007), *City of Westminster Adopted Unitary Development Plan, Saved Policies*.

²⁴ Westminster City Council, *Westminster's City Plan: Strategic Policies November 2013* (agreed 23 August 2013 with changes requested by the Inspector incorporated).

²⁵ London Borough of Islington (2011), *Adopted Core Strategy*.

²⁶ London Borough of Islington (June 2013), *Finsbury Local Plan Part of Islington's Local Plan Area Action Plan for Bunhill & Clerkenwell*.

²⁷ London Borough of Islington (June 2013), *Development Management Policies*.

²⁸ London Borough of Islington (June 2013), *Islington's Local Plan: Site Allocations*.

Primrose Hill to the Houses of Parliament and St Paul's Cathedral (see Map LV-05-001, Volume 5, Landscape and Visual Assessment Map Book). It is also in the background of the protected views from Greenwich Park and Blackheath to St Paul's Cathedral (see Map LV-01-001 and LV-01-002) in the CFA1 Map Book.

- 5.1.45 Euston Square Gardens is protected under the London Squares Preservation Act, 1931. Regent's Park is designated as a Site of Borough Importance for nature conservation and St James's Gardens are designated as a Site of Local Importance (SLI). Heritage assets in the Euston area are numerous and include Grade I, Grade II* and Grade II listed buildings (see Map CT-10-001, Volume 2, CFA1 Map Book).
- 5.1.46 Committed development and future baseline
- 5.1.47 Developments with planning permission or sites allocated in adopted development plans, on or close to the revised scheme, are shown on SES2 and AP3ES Volume 5 Committed Development Map CT-13-001 and listed in Volume 5 Appendix 004-000. Except where noted otherwise in the Appendix, it has been assumed that these developments will have been completed before the main works for the revised scheme commence in 2017.
- 5.1.48 These permissions and allocations are termed 'committed developments' and are treated as potential receptors from the revised scheme. However, where such developments lie wholly or partly within the land required for the revised scheme, it is assumed that these will not be commenced or completed in their proposed form. Such developments are noted in SES2 and AP3 ES Volume 5: Appendix CT-004-000.
- 5.1.49 The definition of 'committed development' has been extended for the assessment of the revised scheme to include a planning application, submitted by LBC in June 2015, for 116 housing units on sites within the Regent's Park Estate, which is intended to provide replacement housing for social housing tenants in LBC housing blocks on the Regent's Park Estate and in Cobourg Street, who will be displaced from dwellings that need to be demolished for HS2. This replacement housing is intended to be available before the demolitions need to occur.
- 5.1.50 There are two major committed developments in the Euston area as shown on SES2 and AP3 ES Map CT-13-001, which are likely to take place after 2017, but to be completed by 2026 i.e. at the same time as construction Stage A of the revised scheme. As such they will be a potential receptor during construction Stage B1 and for the operation of HS2 Phase One after 2026. Where these developments have a particular relevance to an assessment topic, this is noted in the future baseline section for that topic and any cumulative effects have been assessed:
- Opportunity Sites 5 (Rosenheim Building) and 6 (Odeon Site) in the adopted Fitzrovia Area Action Plan; and
 - Site 1: King's Cross Growth Area in the Camden Site Allocations document. Major mixed use development including residential.
- 5.1.51 Planning permission has been granted for the redevelopment of Opportunity Sites 5 (Rosenheim Building) and 6 (Odeon Site) in the adopted Fitzrovia Area Action Plan. The development will consist of a seven storey, plus four basement floor, scheme for medical use. Construction is likely to commence around 2018.

5.1.52 Major developments are already in progress or planned at King’s Cross, including offices, biomedical research, residential, retail and student housing. Later phases of the development may not occur until after 2016 and could continue until late in the construction period for the revised scheme.

5.1.53 Other planning applications yet to be determined and sites that are proposed allocations in development plans that have yet to be adopted, on or close to the revised scheme, are termed 'proposed developments'. These are listed in SES2 and AP3 ES Volume 5 Appendix CT-004-000, but are not included in the assessment. The progress of these proposals is being monitored by HS2 Ltd.

Land required for the revised scheme

5.1.54 In addition to the land that will be required permanently for the revised scheme, land will also be required on a temporary basis for construction, as illustrated on SES2 and AP3 ES Volume 2 Map Book: Map CT-05-001. This additional land includes that within highways needed for utility works.

5.1.55 Land temporarily occupied for construction works will be restored or prepared for suitable alternative uses after construction, following the procedures set out in the Bill.

5.1.56 The specific amendments that are included in AP3 are described more fully in Part 2. Those which require land outside Bill limits are as follows:

- additional land for construction off Stephenson Way AP3-001-001;
- additional land for utilities diversion at Stanhope Street AP3-001-002;
- additional land at Barnby Street and for improvements to open space within the Ampthill Estate AP3-001-003;
- additional land for highway works at Hampstead Road and Harrington Square AP3-001-004;
- additional land for the installation of ground anchors at Park Village East, north of Mornington Street Bridge AP3-001-005; and
- additional land for extension to lorry holding area and replacement parking, Regent’s Park AP3-001-006.

5.2 Description of the revised scheme for Euston

Overview

5.2.1 This overview provides a summary of the revised scheme at the end of 2033.

5.2.2 Euston will be the London terminus for HS2. A new high speed station will be constructed in two stages, partially within the footprint of the existing conventional station and will accommodate high speed train services. The high speed station will extend westwards beyond Melton Street as far as Cobourg Street, which will be realigned and extended northward. The completed high speed station will consist of 11 subsurface high speed platforms at around 4m below the level of the existing conventional railway. At ground level, station and retail accommodation will be

provided in a spine building on the eastern side of the high speed station accessed via a pedestrian street connected to the high speed station concourses. A service and logistics basement will be constructed below the high speed platforms and will be accessed via a vehicular ramp from A400 Hampstead Road Bridge. The layout of the high speed station is shown on illustrative plans in Figures 2-5 in this report and generally on Map CT-06-001, SES2 and AP3 ES Volume 2 CFA1 Map Book.

- 5.2.3 Approximately one third of the western side of the existing conventional station will be demolished to create space for the high speed station. Reconfiguration of the conventional station will involve partial demolition of the western side of the station building and the removal of platforms west of platform 13 as well as relocation of retail and associated station facilities.
- 5.2.4 Improvements will be made to Euston underground station. The existing Euston underground ticket hall will be retained in its current configuration with access from the high speed platforms being provided and a new LU ticket hall will be constructed at a lower level with connections to the high speed platforms. The addition of subsurface links under Euston Road and between Euston underground station and Euston Square underground station will reduce the volume of passenger movements at ground level.
- 5.2.5 The provision of platforms for high speed trains at Euston will require widening of the existing railway retained cutting to the north of Euston station²⁹, to the west of the existing tracks. The high speed railway will enter tunnel at the Euston portal about 100m south of Parkway. The portal will be close to the entrances to the existing railway Park Street Tunnels.
- 5.2.6 The high speed tracks will enter the proposed twin bore Euston tunnel at a deeper level than the existing railway. This will require the reconstruction of retaining walls on the western side of the existing cutting. All three of the existing road bridges across the railway between Euston station and Parkway will be demolished and reconstructed. The listed elements of Mornington Street Bridge will be removed and reinstated as part of the new bridge structure.
- 5.2.7 The conventional railway will remain on or close to its current alignment and levels, but one of the six approach tracks will be removed, requiring rearrangement of signalling and overhead line equipment. In addition, a second line, Line X, will be removed for a period of three years – to allow construction of HS2 in the station approach – before being reinstated.
- 5.2.8 Construction work will commence in 2017, with some enabling works planned for 2016, subject to necessary consents. Works in the station approach and the western part of the high speed station will take place between 2017 and the end of 2026 in construction Stage A. During Stage A, the conventional station will operate with a minimum of 16 platforms. At the end of 2026, the commencement of HS2 Phase One operation, from six new high speed platforms, will allow the number of platforms in the conventional station to be reduced to a minimum of 11.

²⁹ This is also known as the station approach.

- 5.2.9 Construction of a further five high speed platforms including the majority of works on the western side of the conventional station will take place in construction Stage B1 (until 2033). By the end of construction Stage B1, an additional five high speed platforms and the remainder of high speed station facilities will be completed.
- 5.2.10 The revised scheme includes ancillary works to allow potential OSD in the form of strengthened or deeper supporting structures, principally foundations and columns and a deck³⁰ over parts of the high speed railway in the station approach and over the high speed station platforms. These works are included in the Bill and will form part of construction of the high speed station because once the revised scheme has been completed, retrospective upgrades to foundations and structures to enable OSD will not be possible.
- 5.2.11 HS2 Ltd will continue to develop a design for Euston station which embraces the HS2 Design Vision³¹ and reflects the project's commitment to high quality design. During this process, HS2 Ltd will undertake further public engagement for the design of the high speed station, the form of which will be developed closer to the time of construction. An independent design panel consisting of experts from across a wide range of disciplines is also being formed to oversee the design development of HS2 and ensure that the project can achieve its full potential, supporting wider regeneration and connectivity whilst being sympathetic to the local context.

Euston high speed station

- 5.2.12 This section describes the proposed high speed station and works north of the high speed station as far as the Hampstead Road Bridge.
- 5.2.13 Key features of the functional design and layout of the revised scheme as completed in 2033 (at the end of construction Stage B1) are also shown on Map CT-06-001 (Volume 2, CFA1 Map Book) and include:
- the creation of 11 new, 415m long, high speed platforms below street level (with new concourses at street level) to accommodate high speed services. This will involve the partial demolition of the existing station west of platform 13;
 - a new high speed station building with a roof enclosing the high speed station concourses. Station construction will include a working deck aligning with the approximate ground level at Cobourg Street and the provision of additional piled foundations and columns to support potential OSD;
 - high speed station concourses which will be constructed at ground level above the high speed platforms and will be approximately level with Cobourg Street and the existing forecourt in front of the conventional station. These concourses will be linked to the streets surrounding the high speed station via a series of pedestrian routes running east-west across the front of the high speed and conventional station with links to Cobourg Street and Drummond Street. There will also be a pedestrian walkway running from north to south, through the high speed station. The concourses will provide passenger

³⁰ A deck above which the OSD structures will be built. These decks will be located over the high speed railway south of Mornington Street Bridge.

³¹ HS2 Design Vision Preview Publication, June 2015. <https://www.gov.uk/government/publications/hs2-design-vision>

facilities, including ticket halls and retail/catering services. The retail units will vary in size and will include cafes, restaurants and shops to serve passengers and the local community;

- new entrances to the high speed station will be provided to the south from Euston Road and via Euston Square Gardens and the bus station; to the west from Hampstead Road, at the northern end of Cobourg Street and from the north, where there will be taxi drop off and pick up, and public open space extending northwards to Hampstead Road;
- new escalators and lifts providing access between the high speed station concourses at street level and high speed platforms below. Facilities for step-free and fire brigade access will be provided to the high speed concourses, platforms and Euston underground station;
- a basement beneath the high speed platforms which will be constructed to provide servicing for the high speed station and trains. The basement will also house mechanical, electrical and public health (MEP) plant rooms and water attenuation tanks. Delivery and service vehicles will enter and exit the basement via a new vehicular ramp, accessed from the Hampstead Road Bridge;
- new entrances, a subsurface circulation area and ticket halls serving Euston underground station. These additional facilities will include a new entrance located in Euston Square and an entrance located centrally within the high speed station. Euston underground station will also be accessible by pedestrians via subsurface routes from Gordon Street and Euston Square underground station as well as from the street level concourses and will provide ticketing facilities and pedestrian access to all LU platforms. Existing LU pedestrian access will be improved with additional escalators and lifts serving both branches of the Northern line and the Victoria line;
- a new pedestrian subway under Euston Road providing an alternative to crossing at street level;
- offices and welfare facilities for the high speed station and train operations staff. These will be located within the high speed station spine building (located on the eastern side of the high speed station) with facilities for British Transport Police and maintenance located at concourse and basement levels respectively. Plant rooms for heating and ventilation equipment, information technology and telecommunications equipment and electrical switch rooms will also be located at each level and in the basement;
- a reconfigured two-way, linear bus station extending from Melton Street to Eversholt Street. This will remain to the south of the existing conventional station and north of Euston Square Gardens. The existing access for eastbound buses from the A501 Euston Road across Euston Square Gardens will be closed to traffic and replaced by the access from Melton Street;
- eight additional bus stands to the north of the conventional station off Eversholt Street, adjacent to Barnby Street;

- a new main taxi facility at the northern entrance to the high speed station will provide for pick up and set down and will be accessed from the A400 Hampstead Road. New passenger set down areas will also be provided at the northern end of Cobourg Street and in Eversholt Street; and
- a new cycle parking area will be provided on the western side of the high speed station close to the Cobourg Street station entrance.

5.2.14 Illustrative plans of the revised scheme at the end of construction Stage A (2026) and Stage B1 (2033) show:

- the ground-level concourse arrangements, escalators and high speed platforms, the general intermodal transport connections, high speed station entrances and pedestrian routes through the high speed station and the massing of high speed station accommodation and ancillary buildings (Figures 2 and 3); and
- high speed station servicing and logistics arrangements at ground and basement levels (Figures 4 and 5).

Figure 2: 2026 high speed concourse-level arrangements

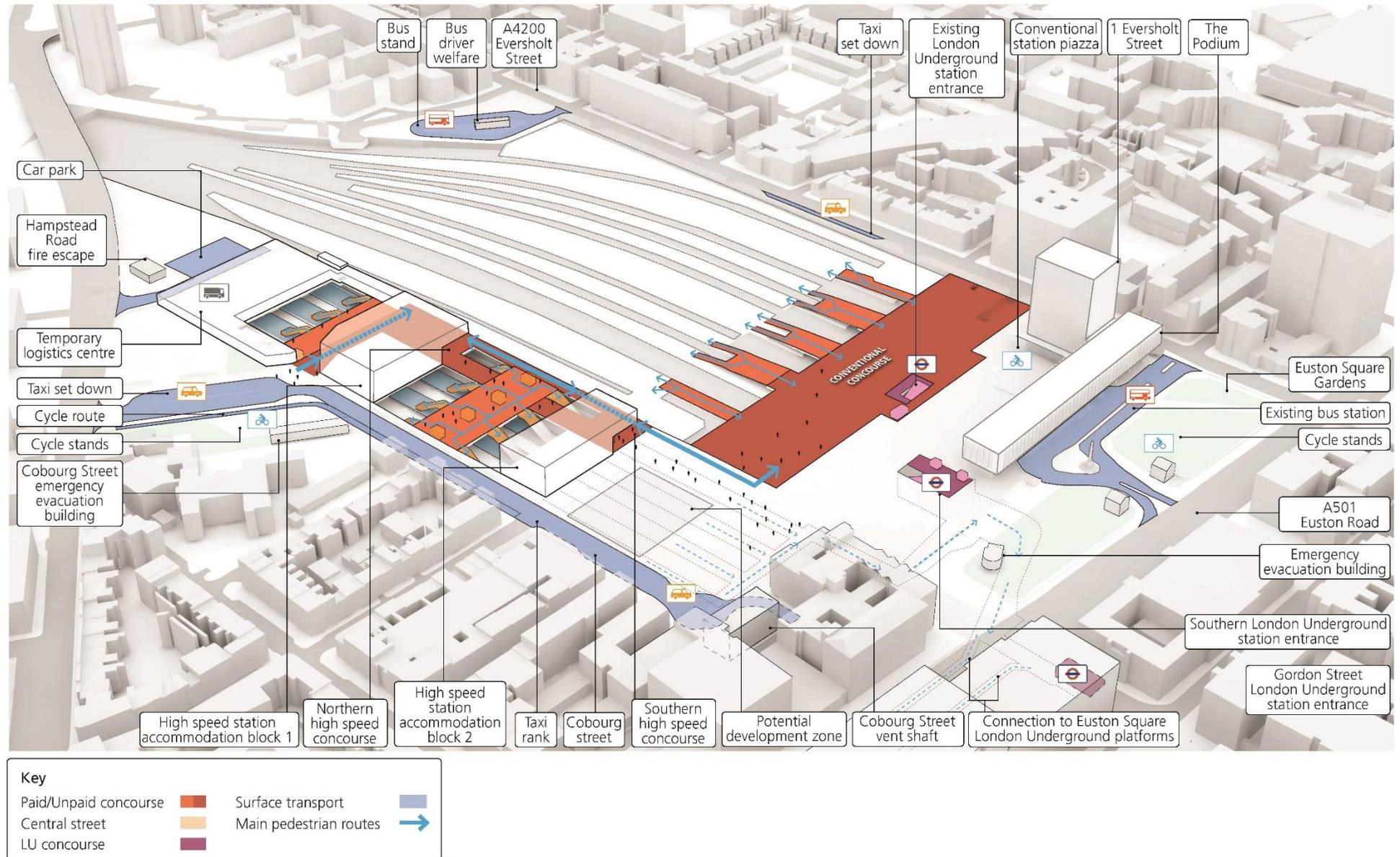


Figure 3: 2033 high speed concourse-level arrangements

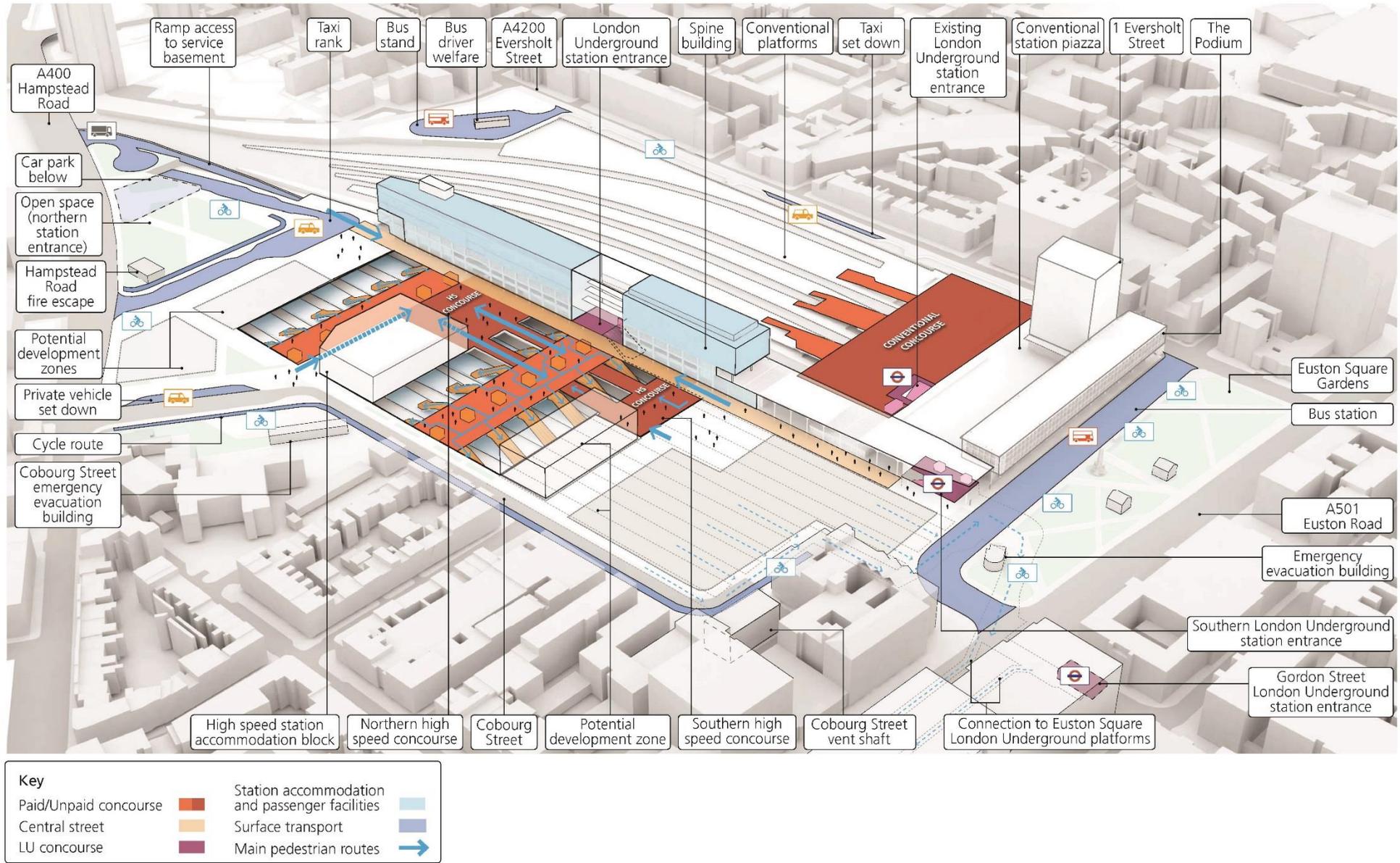
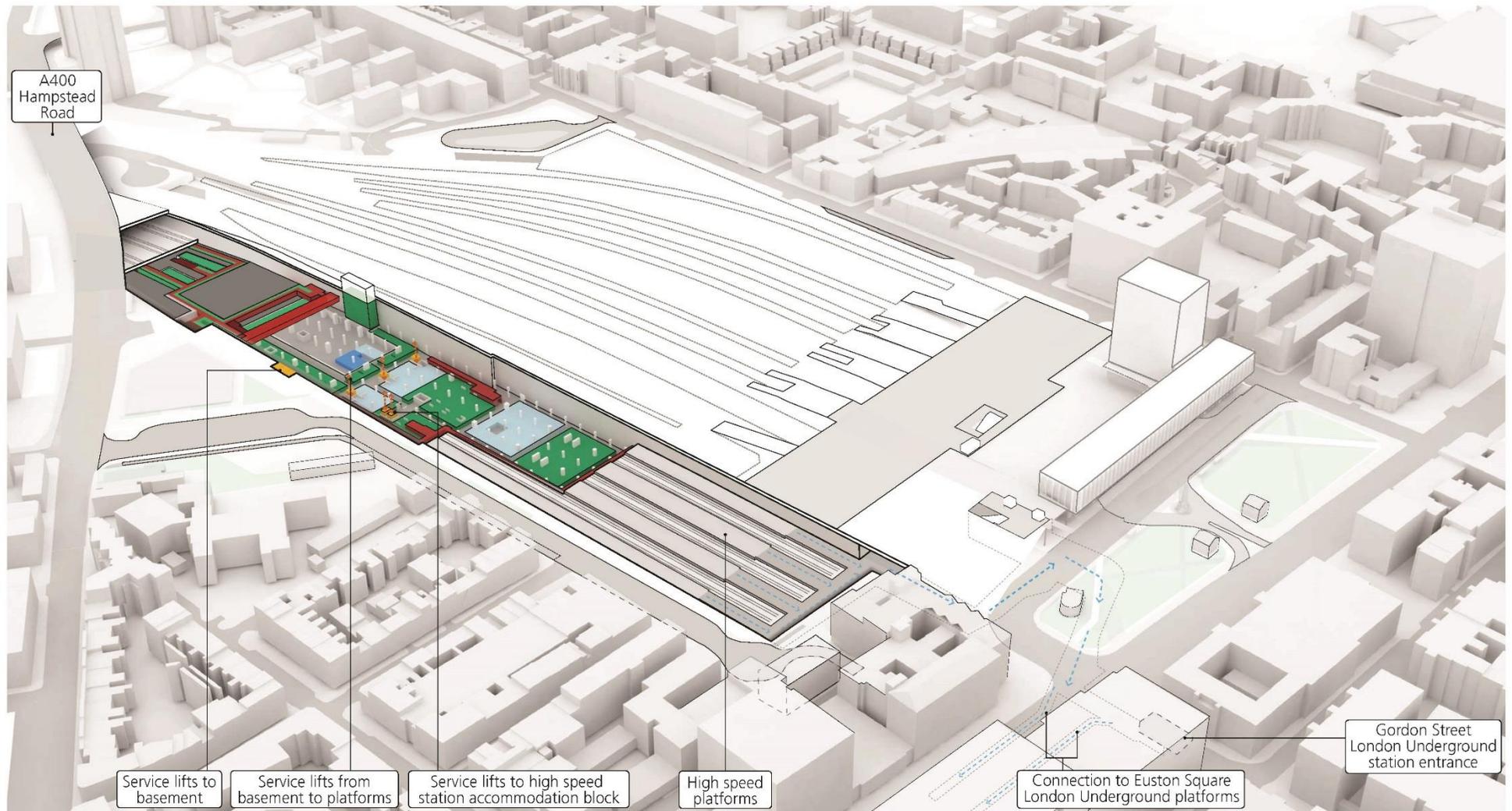


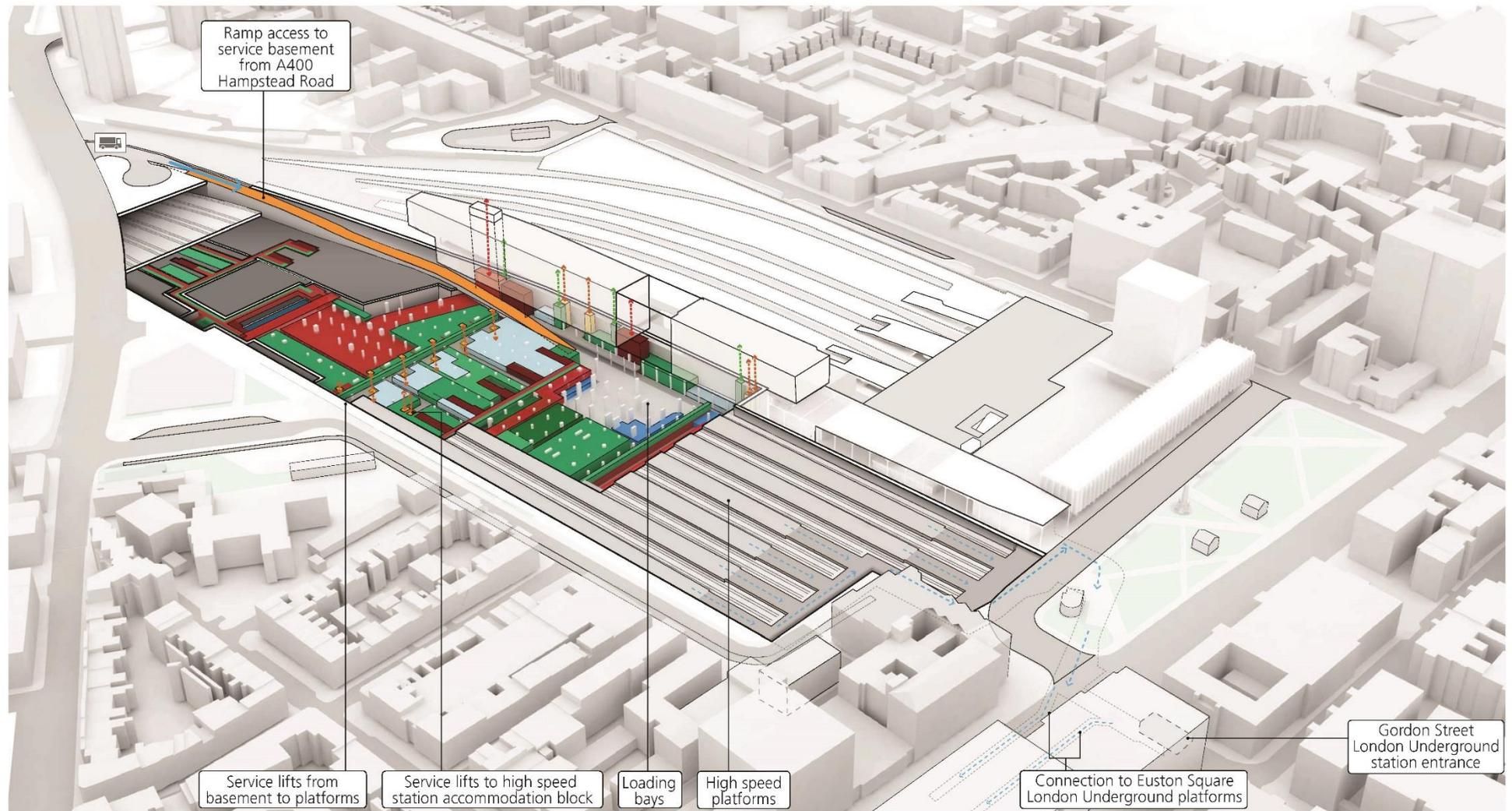
Figure 4: 2026 high speed basement and servicing arrangements



Key

Fire escape	Station operations	Platform ventilation plant	
Basement ramp	MEP	Platform ventilation duct	
Retail storage	Waste management area	Main pedestrian routes	→

Figure 5: 2033 high speed basement and servicing arrangements



Key			
Fire escape	Station operations	Platform ventilation plant	
Basement ramp	MEP	Platform ventilation duct	
Retail storage	Waste management area	Main pedestrian routes	→

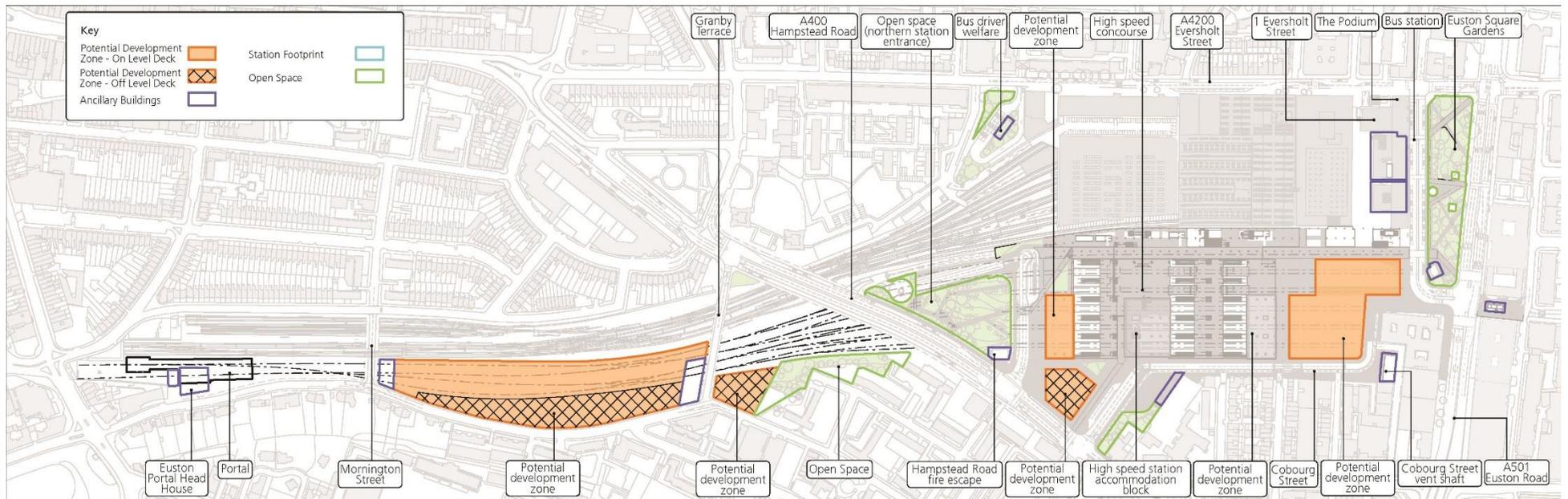
- 5.2.15 A plan showing the extent of open space, potential OSD development plots³² and the location of ancillary buildings outside the main station footprint included in the revised scheme is provided as Figure 6.
- 5.2.16 The connections to LU from the high speed and conventional stations, including new and existing underground entrances and connections with Euston Square underground station (Figure 7).
- 5.2.17 Illustrative cross sections and elevations of the remodelled station are shown in figures CT-20-001, CT-20-002 and CT-20-003 (Volume 2, CFA1 Map Book).
- 5.2.18 Artist's sketches (see LV-14-001 to LV-14-004, Volume 2, CFA1 Map Book) illustrate how the completed station could appear from key viewpoints, including the three new high speed station entrances and the pedestrian links to Drummond Street. The sketches are for illustrative purposes and demonstrate the possible regeneration opportunities at Euston, including indications of potential OSD. These elements do not form part of the revised scheme and would require separate planning permissions.
- 5.2.19 In construction Stage A, two three-storey buildings will be constructed on the western side of the high speed station deck facing Cobourg Street. These will comprise two permanent buildings housing retail facilities and providing temporary station and railway accommodation. In addition, a single-storey temporary station servicing building will be constructed at the north end of the high speed station. Once the station spine building and service and logistics basement have been completed in construction Stage B1, most station accommodation and servicing activities will be moved from the buildings fronting Cobourg Street into the spine building and into the service and logistics basement.
- 5.2.20 The high speed station building heights will not exceed a maximum height of 60m Above Ordnance Datum (AOD)³³, equivalent to between 35m and 40m above existing ground levels. This maximum height also applies to the side of the station along Cobourg Street, although the height of the façade is likely to be lower and not of uniform height.
- 5.2.21 With the exception of the western part of the existing station, the external fabric of the existing station including the Eversholt Street frontage will generally not be altered in the revised scheme. However, the revised scheme design is compatible with the potential future redevelopment of the conventional station³⁴.

³² Potential OSD development, plots (zones) comprise decks over the high speed railway south of Mornington Street Bridge and development land where the plot is on land that is not over the high speed railway. Decks will be designed only for construction loadings.

³³ The height limits are those specified in the Bill.

³⁴ The potential future redevelopment of the conventional station, also referred to as a potential B2 construction stage, is not part of the revised scheme and has not been assessed.

Figure 6: Revised scheme – open space, potential development zones and ancillary buildings



5.2.22 A ventilation shaft serving the Euston underground station is to be rebuilt at the southern end of Cobourg Street. Its height will not exceed 45m AOD, about 20m above the existing ground level. Additional small buildings will be constructed, close to the high speed station, to provide access for fire fighting and emergency escape. These will be located in: Euston Square Gardens; at the northern end of Cobourg Street; and to the north of the high speed station. Some of these buildings will also provide emergency escape for the underground. These buildings vary in height in relation to the adjacent street level, lower than the 45m AOD limit for this location.

Euston conventional station

5.2.23 This section describes works to the conventional station that will be undertaken to allow the high speed station to be constructed while maintaining the required level of service on the conventional railway.

5.2.24 Where existing conventional station operational facilities are removed due to the high speed works, these will be reprovided within a modified conventional station.

5.2.25 Works to the conventional station will include the following:

- platforms – in construction Stage A – reconfiguration of platform provision and renumbering of the remaining platforms, and remodelling of the associated conventional station structure. In construction Stage B₁, platforms on the western side of the conventional station will be closed³⁵ and this part of the conventional station demolished to make space for the remainder of the high speed station;
- station servicing – the existing station retail units and other station accommodation are serviced primarily from a service basement beneath the station concourse. The service basement is accessed by a ramp from Eversholt Street, with service vehicles then egressing via a ramp to Melton Street. As a result of the closure of the Melton Street exit ramp during construction Stage A, egress from the service basement will be changed permanently so that a two-way flow of service vehicles will be established to and from Eversholt Street; and
- reprovision of retail, operational facilities, accommodation and MEP, including ticket hall, standard class lounge, mobility assistance reception, trade reception, lost property and left luggage and British Transport Police accommodation. This will include the removal and replacement of retail units on the conventional station forecourt, north of the Podium building.

Station public realm and surface access

5.2.26 The three principal entrances to the completed high speed station will ensure that it can be accessed, step-free, from the surrounding area and will encourage pedestrian use, particularly along Drummond Street and Cobourg Street. The entrances will be accessed as follows:

- from the south through the Euston Road station entrance – via a pedestrian

³⁵ West of existing platform 13.

street from the bus station and Euston Road. This station entrance will also be accessible from the west from Drummond Street;

- from the west through the Cobourg Street station entrance – via a forecourt from the Hampstead Road, opposite Robert Street, at the north end of Cobourg Street; and
- from the north through the Hampstead Road station entrance – via the A400 Hampstead Road and the new taxi facility and public open space to the north of the high speed station.

- 5.2.27 The revised scheme will increase the overall size of the footprint of stations at Euston by about a quarter. The high speed station buildings will be about the same length – from south to north – as the adjacent conventional station building, but the overall width of the two stations between Eversholt Street and Cobourg Street will be increased to about 280m, an increase of approximately 70m along this frontage.
- 5.2.28 The revised scheme will create new and reinstated publicly accessible space. This includes the Euston Road station forecourt, south of the high speed and conventional station; the bus station and Euston Square Gardens and the Cobourg Street and Hampstead Road station entrance forecourts. These will be connected to new pedestrian streets running east-west across the front of the high speed and conventional station with links to Cobourg Street and Drummond Street and a pedestrian street running from north to south, through the high speed station.
- 5.2.29 The Euston Road station forecourt will provide the central axis and main southern route to the high speed station and will also provide access to the conventional station via the existing piazza. It will no longer be dominated by Grant Thornton House (also known as 22 Melton Street) and One Euston Square (also known as 40 Melton Street), which are to be demolished. The forecourt will include areas of hard and soft landscaping.
- 5.2.30 A forecourt will be located at the northern high speed station entrance (Hampstead Road station entrance) adjacent to the new main taxi facility. The forecourt will include both hard and soft landscaping³⁶. A large triangular area of landscaped green open space³⁷ will be provided adjacent to the taxi facilities and there will also be car parking mainly for train operating company staff in a car park located beneath the deck.
- 5.2.31 There will be a western high speed station entrance at the northern end of Cobourg Street (the Cobourg Street station entrance). This forecourt will incorporate a cycle hub and the remaining elements of St James's Garden, which will be returned to public use as a landscaped area. There will also be provision for passenger drop off from private vehicles at this location.
- 5.2.32 Euston Square Gardens will be reinstated and unified by moving the bus station access to Melton Street instead of the present location, between the lodges, where it effectively bisects the gardens. Broadly, there will be a balance between the area of soft landscaping removed and that gained from removing the existing bus access.

³⁶ In raised planters.

³⁷ This open space will be located on the opposite side of Hampstead Road to the Regent's Park Estate residential area.

Pedestrian routes through the gardens will be realigned. The linear bus station will allow pedestrians to cross easily at surface level from the gardens and Euston Road onto the station forecourt.

- 5.2.33 New public open space will be created at the northern end of the Regent's Park Estate, between the railway and Langdale. It will incorporate land that is at present part of Hampstead Road Open Space, Eskdale play area and other land on the Regent's Park Estate. The space will include grass, planting, children's play areas and a multi-use games area (MUGA). Improvements will also be made to the open space within the Amptill Square Estate, once utility works have been completed in this area. These improvements may include the provision of play facilities.
- 5.2.34 Primary pedestrian routes such as Drummond Street, Cobourg Street and the approaches from Hampstead Road and Euston Road, will incorporate planting as part of a holistic landscape strategy as part of the revised scheme.
- 5.2.35 Opportunities for other landscaping will be explored during detailed design, where land is used during construction, but is not occupied by permanent works or buildings.
- 5.2.36 Significant changes and/or improvements to surface access in and around the station will include:
- northern and southern concourses connected by a north-south pedestrian route running parallel to the high speed station spine building. The concourses will provide links to high speed platform levels and the underground stations and will extend across the whole of the central part of the high speed station. The high speed station spine building will include a new ticket hall and retail units and will also have waiting areas and lounges, passenger information, retail outlets, cafes and restaurants and public conveniences;
 - a new taxi rank on the deck north of the high speed station, accessed from the A400 Hampstead Road. This access road – with segregated cycleway – will be used by taxis, cyclists and pedestrians and also provide access to a private car park for train operating company, station management and maintenance and British Transport Police staff;
 - Cobourg Street, which will be realigned and extended north to the A400 Hampstead Road and, will include passenger set down and a segregated cycleway;
 - provision of a north-south pedestrian access route from Euston Square Gardens through the high speed station and east-west across the front of both stations between Cobourg Street and Eversholt Street, broadly continuing the alignments of existing streets;
 - the northern end of Gordon Street which will be permanently closed to vehicles, but will retain pedestrian and cycle connections. This is the location of a new Euston Square underground station entrance and pedestrian subway under Euston Road;
 - the bus station, which will remain south of the conventional station and north of Euston Square Gardens, will be reconfigured as a two-way, linear bus

station extending from Melton Street to Eversholt Street³⁸. The existing access for eastbound buses from the A501 Euston Road will be closed and moved to Melton Street. Pedestrians will be able to walk across the bus station from the high speed station (i.e. from the Euston Road station forecourt) to the A501 Euston Road;

- a new pick-up and drop-off facility for mobility impaired passengers at the Cobourg Street station entrance. All of the public parking, car hire facilities and car hire pick up/drop off in the existing conventional station will be removed;
- improved cycle parking will be provided, with approximately 2,000 public cycle spaces at a number of locations around the station. There will also be improved north-south cycle routes around the station;
- approximately 200 cycle-hire docking stations dispersed in streets close to the stations;
- a new layby on Eversholt Street to allow passenger set down by taxi and private car. The main taxi facility at the northern entrance to the high speed station will provide for pick up, set down and taxi ranking accessed via the A400 Hampstead Road; and
- a dedicated access for delivery and service vehicles for the high speed station to enter and exit the new service and logistics basement via a new vehicular ramp positioned central to the site, accessed from the Hampstead Road Bridge.

5.2.37 The high speed and conventional stations will be operationally independent, but will have easy connections to all other transport modes. The connections to these other modes are illustrated in Figures 3 and 7.

5.2.38 New escalators and lifts will provide access between the high speed concourses and platforms. All high speed platforms will also have direct subsurface exits to Euston underground station via the end of the platforms as well as a new centrally located entrance and LU circulation area beneath the high speed station spine building. The new LU circulation area will provide a connection to the existing centrally located LU ticket hall and from there to the Northern (Bank Branch) and Victoria lines. There will also be connections to a new centrally located ticket hall which will provide direct links to the Victoria line and Northern (Bank and Charing Cross) line. Passengers arriving on high speed trains can either remain at the same level to directly access the underground station, or take escalators up to the concourses at street level to access other modes of transport. From the concourses, there will be pedestrian routes to and from Euston underground station, Euston Square station, the bus station and the taxi rank north of the high speed station.

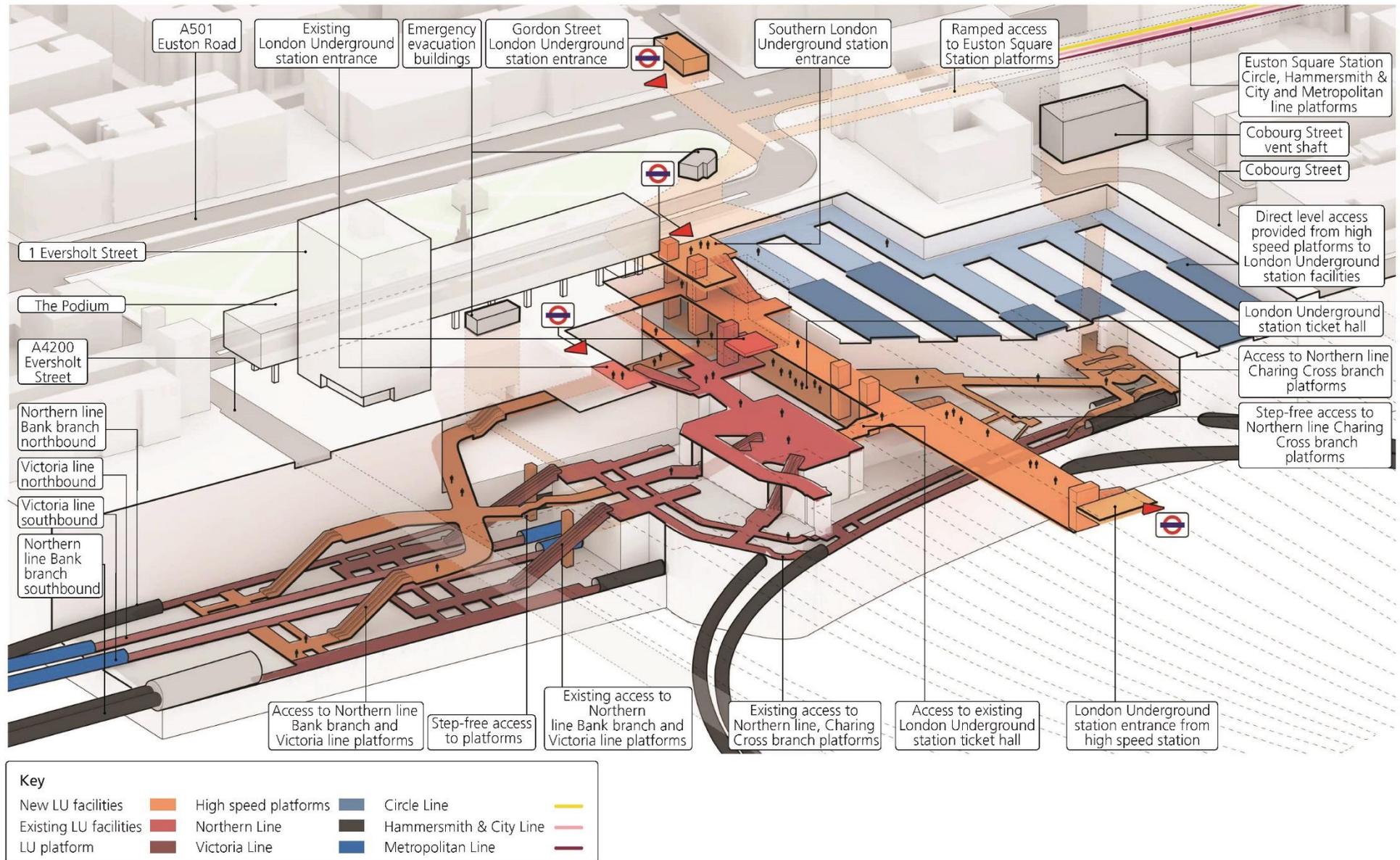
5.2.39 A pedestrian subway beneath Euston Road will provide a direct subsurface link to a new entrance for the underground station on Gordon Street, as well as access to the Euston Square underground station. Step-free access will be provided throughout the underground facilities with a dedicated central underground entrance that can be

³⁸ Eight additional bus stands will also be provided to the north of the conventional station on the former Royal Mail delivery office site.

utilised by passengers from both railway stations. This central access will allow maximum flexibility for integration with both of the high speed concourses (southern and northern) and will provide additional subsurface LU routes.

- 5.2.40 It will be possible to access the new and extended LU ticket halls from Gordon Street and Euston Square via the new pedestrian subways as well as from the high speed station concourses. Where there are significant differences in levels between the ground level underground station entrances and high speed concourses, the exits from the pedestrian subways and the LU new ticket hall, new escalators will be provided.
- 5.2.41 The high speed station works will not include pedestrian connections to the proposed Crossrail 2 station at Euston/Kings Cross. However, the design of the high speed station construction works will not prevent such a connection being made in future by others.

Figure 7: London underground connections



Station approach

5.2.42 This section describes the works proposed in the station approach, between Hampstead Road Bridge and Parkway, where the high speed railway will enter into the tunnel, as shown on Map CT-o6-001 (SES2 and AP3 Volume 2, CFA1 Map Book). Three bridges are to be replaced:

- Hampstead Road Bridge (elevations and cross sections can be seen in Figure CT-20-004, Volume 2 Map Book), which currently carries a six lane road, will be demolished and rebuilt close to its current alignment to allow the new high speed station service and logistics basement access ramp to connect to the south side of the bridge. It will be extended to a total length of about 200m. The carriageway level of the replacement bridge will be up to 4.8m higher than at present to allow for longer bridge spans and sufficient clearance for high speed and conventional trains to pass underneath;
- Granby Terrace Bridge, which will be demolished and rebuilt as a narrower bridge, without parking bays, in two sections, on a slightly altered alignment. The bridge will be extended to a length of about 90m and the carriageway level of the replacement bridge will be up to 1.8m higher at the eastern end than at present, to tie in to the raised levels at the northern end of the Hampstead Road Bridge; and
- Mornington Street Bridge, which will be demolished in order to construct the high speed dive under north structure. The bridge will be rebuilt in its current position reinstating the listed elements of the structure.

5.2.43 Other key features of the design and construction activities in this section include:

- a new dive under, to serve high speed trains, which will be constructed north of Granby Terrace Bridge;
- removal of redundant assets to provide a working area at track level to create the Carriage Shed and Park Village East satellite construction compound. This will involve the demolition and removal of an unused railway carriage shed during construction Stage A;
- the removal of two existing lines, one of which will be reinstated after a three year period of closure (Line X) and measures to protect the existing Line X dive under which passes under the other four conventional railway approach tracks, located on either side of Mornington Street Bridge. Line X would then be reinstated over the top of the eastern high speed track;
- the provision of decks above the high speed tracks and over the high speed dive under south of Mornington Street Bridge. These decks will be built to facilitate OSD, wherever this is feasible, over the high speed railway³⁹;
- a plant building which will be constructed adjacent to the rebuilt Mornington

³⁹ It has been assumed that only this area will be decked over, with any works to provide a deck between the high speed railway retaining wall on the site of the carriage shed and Park Village East requiring a separate planning permission, because it will not be above or affect operational railway.

Street Bridge, housing tunnel ventilation and electrical equipment required for the covered sections of the high speed tracks in the station approach. This building will be up to 8m above the existing street level;

- a building which will be constructed adjacent to the rebuilt Granby Terrace bridge, providing firefighting access only required for the covered sections of the high speed tracks in the station approach. This building will be up to 8m above the existing street level;
- the twin-bore Euston Tunnel portal which will be constructed approximately 150m south of Parkway and the existing Park Street Tunnels on the alignment of the western pair of existing railway tracks. The two tunnel entrances at the portal will be separated, with one entrance about 60m north of the other. The tracks will also be at different levels as the railway enters the tunnels;
- the permanent closure of one of the lines in the western Park Street Tunnel that is used by conventional trains approaching and departing Euston. The other, Line X⁴⁰, will be closed for up to three years to allow construction of the high speed rail works, before being reinstated. The eastern four track tunnel will be retained and will remain operational throughout construction of the high speed railway; and
- a headhouse which will be constructed at the high speed tunnel portal. It will be a multi-storey structure, with the main structure below street level, which will straddle the western high speed track immediately south of the tunnel entrance. The structure will contain mechanical, electrical and safety equipment to serve the tunnel. There will also be an auto-transformer station. Its roof will be at approximately street level, though there will be an entrance building on a smaller footprint up to 8m in height above street level for access and egress.

- 5.2.44 The existing retained cutting between Euston station and Granby Terrace Bridge will be widened to the west, to accommodate the revised scheme. Between Euston station and Mornington Street Bridge, new retaining walls will be constructed along all of the west side of the high speed railway. Between Mornington Street Bridge and the high speed tunnel portal, the existing retaining wall to the west of the conventional tracks will be replaced.
- 5.2.45 The high speed tracks will be approximately 4m lower than the existing conventional tracks and about 9m below existing street level at Hampstead Road Bridge. At the tunnel portal, the eastern and western high speed tracks will be at about 30m and 23m below existing street level, respectively. The conventional railway will generally remain on the existing vertical alignment and the eastern retaining walls and parapets will remain.
- 5.2.46 On the western side of the approach, 1.8m high solid parapets will be provided to give protection to the railway i.e. adjacent to Park Village East and bridges and where OSD decks are provided above the high speed railway. The parapets on the replacement

⁴⁰ The assessment of the environmental effects of the Line X reinstatement has been based on a conceptual design for this element of the revised scheme.

Mornington Street Bridge will be constructed to the same standards but brick clad to resemble the original parapets. Elsewhere, parapets will be constructed in concrete but will be clad in materials that are in keeping with the setting in which they are installed. Brick walls and planters removed to facilitate the construction of the high speed portal, dive under and retaining walls, along Park Village East will be replaced.

- 5.2.47 In locations away from the railway, where parapets are not installed, it is likely that vehicle containment barriers will be required e.g. where the road levels are above the adjacent ground level, such as the Hampstead Road Bridge approach from the south.

5.3 Construction of the revised scheme for Euston

- 5.3.1 The high speed station will be constructed in two stages. The first – construction Stage A – between 2017 and 2026 and the second – construction Stage B1 – between 2026 and 2033.
- 5.3.2 This section sets out the strategy for construction of the revised scheme in the Euston area, including:
- an overview of the construction process;
 - a summary of the draft CoCP;
 - a description of the enabling works, including demolitions and utility works, most of which will be undertaken in advance of the main works;
 - details of station, track and highway drainage;
 - descriptions of the construction site compounds;
 - a description of the highway closures and construction traffic access; and
 - a summary of construction waste and materials.
- 5.3.3 The assessment in this report assumes that the construction will be carried out as set out in this section, using the techniques described. A guide to standard construction techniques is provided in Volume 1, Section 6 of the main ES.

Overview of the construction process

- 5.3.4 Construction of the station and railway will comprise the following general stages:
- advanced works, including: site investigations; preliminary mitigation works; preliminary enabling works; demolitions and utility diversions;
 - civil engineering works, including: establishment of site compounds; site preparation and enabling works; earthworks; structural works including retaining walls, bridges and OSD enabling works; station construction and fit out; site restoration; and removal of site compounds; and
 - railway installation works, including: establishment of site compounds; railway infrastructure installation; fit out of tunnels, ventilation shafts or other buildings; changes to the existing railway network; removal of site compounds; and railway testing and commissioning.

Code of Construction Practice

5.3.5 General provisions of the draft CoCP relating to the construction process are set out in more detail in Volume 1 of the main ES and the draft CoCP (see Volume 5 of the main ES: Appendix CT-0003-000/1). Key provisions of relevance to this report include:

- environmental management and the draft CoCP, Section 2;
- working hours – see Volume 1, Section 6.3, and the draft CoCP, Section 5;
- operation of site compounds – see Volume 1, Section 6.6, and the draft CoCP, Section 5;
- management of utilities diversions – see Volume 1, Section 6.4, and the draft CoCP, Section 14;
- management of construction traffic – see Volume 1, Section 5, and the draft CoCP, Section 14; and
- handling of construction materials – see Volume 1, Section 6.3, and the draft CoCP, Section 15.

Working hours

5.3.6 As reported in the draft CoCP, core working hours will be from 08:00 to 18:00 on weekdays (excluding bank holidays) and from 08:00 to 13:00 on Saturdays. The following elements of construction of the revised scheme at Euston will generally take place during the core working hours:

- the majority of station works including site preparation and enabling works, main earthworks, structural works, building works and fit-out;
- the majority of utility works;
- most demolitions, but excluding parts of the station structure and the carriage shed as well as some demolition activities associated with railway possessions;
- excavation of the station and high speed station approach and part of the conventional railway approach;
- the southern section of the high speed dive under;
- the majority of the tunnel portal construction;
- construction of the station;
- high speed railway and conventional systems fit-out; and
- elements of the Euston underground station remodelling.

5.3.7 However, at Euston, part of the construction will take place on or immediately adjacent to the existing operational railway where safety considerations for the workforce mean that work has to be completed during possessions or blockades of the railway. Possessions and blockades close or limit the use of the railway for trains, so normally take place at night, weekends or over bank holidays, so that there is less disruption to services and passenger access/movements.

5.3.8 Consequently, the working hours at Euston will not be confined to the core hours. Site specific variations to core hours and/or additional hours that will be required will be included within a local environmental management plan (LEMP) that will contain more detailed provisions, which is being prepared in consultation with LBC. The following activities are likely to require work to be undertaken outside core working hours:

- the majority of enabling works associated with the conventional railway;
- demolition of bridges over the operational conventional railway;
- works on the conventional railway track, signalling and other railway systems;
- subsurface tunnelling, excavations and civil engineering works associated with the underground stations;
- elements of the construction of road and other bridges over the operational railway;
- construction of elements of the retaining structures at Park Village East and those in close proximity to the operational railway;
- deliveries of large components, such as bridge beams, heavy plant and equipment;
- elements of the utility diversions in Euston Road, Hampstead Road and elsewhere in order to avoid daytime traffic disruption;
- conventional dive under reinstatement works and the northern section of the high speed dive under and portal;
- building fit-out of the station;
- mechanical, electrical, public health and telecommunication systems relocations in the station; and
- setting up temporary vehicle and pedestrian diversions.

Enabling works

5.3.9 General information about enabling or advanced works can be found in Volume 1, Section 6.4 of the main ES. The following activities, which will commence in advance of the main construction engineering and construction works, will be required in the Euston area:

- utility surveys and diversions;
- site investigations and surveys;
- establishment of construction compounds and worksites;
- archaeological investigations and removal of graves in St James's Gardens;
- building surveys;
- demolitions; and

- the conventional railway enabling works.

5.3.10 For further details on site investigation and surveys, archaeological investigations and grave clearance in St James’s Gardens and building surveys, reference should be made to SES2 and AP3 ES, Volume 1. Demolition work, the establishment of site compounds and conventional railway enabling are described in more detail in the following paragraphs.

Demolition works

5.3.11 The revised scheme will require the demolition of buildings and structures in the area, which are listed in Table 2. Residential demolitions are discussed further in Section 8 and those which affect businesses in Section 13.

Table 2: Demolition works in the Euston area

Description of structure	Location	Likely timing for demolition
Residential and community buildings		
3 storey masonry terraced houses (3 flats)	14-15 Melton Street	2017
3 storey masonry residential building	58 Euston Street	2017
3 storey masonry residential building	60 Euston Street	2017
3 storey masonry residential building	62 Euston Street	2017
3 storey masonry residential building	64 Euston Street	2017
3 storey masonry building (lower floor used as a retail unit, upper floor has 1 flat)	77-79 Euston Street	2017
4 storey steel/masonry building. (Lower floors used as offices, upper floors includes 7 flats)	1 and 3 Cobourg Street	2017
3 storey masonry residential building (3 flats)	59 Cobourg Street	2017
3 storey masonry residential building	Flats A-C, 61 Cobourg Street	2017
3 storey masonry residential building	Flats A & B, 65 Cobourg Street	2017
3 storey masonry residential building (3 flats)	67 Cobourg Street	2017
3 storey masonry public house (1 flat)	Bree Louise public house, 69 Cobourg Street	2017
7 storey residential building	Silverdale, Regent’s Park Estate	2018
69 dwellings		

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Description of structure	Location	Likely timing for demolition
4 storey residential building and garages 39 dwellings	Ainsdale, Regent's Park Estate	2018
9 storey residential building 60 dwellings	Eskdale, Regent's Park Estate	2018
Single storey community hall	Old Tenants Hall, Harrington Street, Regent's Park Estate	2018
5 storey brick residential building 20 dwellings	Stalbridge House, 231 Hampstead Road	2017
5 residential flats over ground floor offices	Granby House, Granby Terrace	2017
Commercial buildings		
Single storey restaurants and cafes (2 units)	Food outlets etc. on station forecourt	2017
10 storey office building, unknown construction	Grant Thornton House, 22 Melton Street	2017
16 storey office building, unknown construction	One Euston Square (also known as 40 Melton Street and formerly Railtrack House)	2017
6 storey building including laboratory and technical support facility, unknown construction	Wolfson House, 4 Stephenson Way	2017
5/6 storey office building, unknown construction	Walkden House, 10 Melton Street	2017
4 storey showroom and office building	11-13 Melton Street	2017
3 storey office building, construction unknown	54-56 Euston Street	2017
3 storey masonry building	The Cottage Hotel, 67-75 Euston Street	2017
3 storey shop/office/warehouse	93-103 Drummond Street	2017
4/5 storey masonry building	Ibis Hotel Euston, 3 Cardington Street including underground car park	2017
5/6 storey building, construction unknown	Thistle Euston Hotel, Cardington Street	2017

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Description of structure	Location	Likely timing for demolition
4/6 storey brick warehouse building	Offices, 132-140 Hampstead Road	2017
Single storey portable buildings	Addison Lee car park, Hampstead Road	2017
4 storey office with single storey warehouse	Royal Mail delivery office, 1 Barnby Street	2022
Single storey masonry building	Building between station and Royal Mail delivery office	2017
Two single storey prefabricated retail units	Under the Podium, conventional station forecourt	2020
Railway buildings and structures		
Euston conventional station, construction various	Parcels deck access ramp (west)	2017
	Subsurface car park	2020
	Western wall adjacent to conventional platforms	2018
	Western part of station west of platform 13	2027
4 storey concrete/masonry building	Euston power signal box, Cardington Street	2018
Train shed with steel truss roof	Carriage Shed (adjacent to Park Village East)	2017
4 span pre stressed concrete bridge	Hampstead Road Bridge (will be rebuilt)	2018
4 span pre stressed concrete bridge	Granby Terrace Bridge (will be rebuilt)	2017
4 span steel and masonry bridge	Mornington Street Bridge (will be rebuilt)	2018
Single storey hut	Portable building at northern end of Mornington Terrace sidings	2017
Single storey masonry building with basement	Former underground station entrance on corner of Melton Street and Drummond Street	2017
Single storey masonry electrical substation	Electrical substation, Barnby Street	2017
Vacant buildings		
6 storey masonry building	National Temperance Hospital (South Wing), Hampstead Road	2017
4/5 storey masonry building	National Temperance Hospital (North Wing), Hampstead Road	2017

Description of structure	Location	Likely timing for demolition
Single storey petrol station with canopy	Petrol station, 142 Hampstead Road	2017

Utility works

- 5.3.12 Some of the utility works, such as those to enable the works to the A400 Hampstead Road Bridge, are programmed to be carried out before the Bill receives Royal Assent in December 2016. These are assessed in this ES, but will be undertaken under separate 'stakeholder powers' or planning permissions.
- 5.3.13 The revised scheme includes appropriate provision for potential OSD above the station and station approach. Although HS2 Ltd will not be constructing the OSD, appropriate provision will be made during railway and station works to facilitate the construction of OSD. It should be noted that, as a principle, only those utility upgrades that could cause disruption to future operation of the high speed railway and those within the following areas which are the 'utilities construction zone' (UCZ) are being considered to be part of the revised scheme:
- adjacent to the station and station approach; or
 - across the new Hampstead Road Bridge and Mornington Street Bridge.
- 5.3.14 Utility reinforcements which lie outside the UCZ are not being considered as part of these works, but will be for the future OSD developers to agree, design and install, and will be subject to separate approvals.
- 5.3.15 The general locations of proposed utility works are indicated on SES2 and AP3 ES Maps CT 05-001 (Volume 2 CFA1 Map Book). All of these are underground services, except where they cross bridges. The impacts of these utility works have been assessed, although the detailed arrangements for implementing them are still being refined.
- 5.3.16 The refinements relate to:
- how individual utility works may need to be packaged at any one location so that environmental effects are minimised by avoiding repeated excavations;
 - the density of utilities in London streets and the potential need to move existing utilities onto diversion routes to create space for the diverted utilities; and
 - certain utilities that have been identified from records, but site investigations will be necessary to verify their position on the ground.
- 5.3.17 In order to assess the environmental effects of utility works at Euston, a number of robust general assumptions have been made. Where there are exceptions to these assumptions, these are noted in the assessment (see Sections 6 to 16). The general assumptions are:
- the majority of utility works will take place during core working hours although there will be a requirement for some night-time working (for example, when crossing major roads);

- the works will generally take the form of a 'rolling work' site that will be moved along the utility diversion route over time, though at some locations pits may remain open for considerable periods of time to allow for existing utilities connections and disconnections. The overall length of a worksite, at any one time, will typically be no more than 50m;
- there will be partial closure of roads resulting in traffic controls with single way working; and
- where multiple diversions need to take place in the same street, it has been assumed that the works will be arranged to avoid multiple openings.

5.3.18 Utility works generally involve the following activities:

- trenching and excavation;
- laying of pipes or ducts;
- construction of chambers;
- cable pulling and jointing;
- connecting, testing and commissioning; and
- reinstatement.

5.3.19 In summary, the main utility diversions or utility replacement/strengthening works required in the area will be:

- temporary diversions of various services carried on the existing Hampstead Road Bridge onto temporary utilities bridges located north and south of the existing road bridge. These services will be relocated back into the replacement bridge structure and the temporary utilities bridges removed at the end of the construction Stage A;
- permanent and temporary diversions of 66kV extra high voltage and high voltage cables across the station approach, including a permanent diversion of a small low pressure gas main along Stanhope Street and Robert Street;
- permanent and temporary diversions of various services carried on Granby Terrace Bridge;
- permanent and temporary diversion of various services carried on Mornington Street Bridge onto a temporary utilities bridge that will be constructed south of the existing bridge. These services will be relocated back into the replacement bridge structure and the temporary utilities bridge removed at the end of construction Stage A;
- in Hampstead Road, Mornington Crescent, Lidlington Place and Varndell Street, where raising of the carriageway will require some utilities to be raised;
- potential permanent diversion of a sewer in Eversholt Street, via Phoenix Road and Chalton Street;
- permanent diversion of a 36-inch low pressure gas main that crosses Euston

Square Gardens from Drummond Street to Eversholt Street. The current design proposes that the diversion will remain in Euston Square Gardens, but on a different alignment;

- various utilities on Regent's Park Estate will be permanently diverted. Diversion routes may include Stanhope Street, Augustus Street, Varndell Street, Cumberland Market, Robert Street, Harrington Street and Mackworth Street;
- various permanent utility diversions in the vicinity of Starcross Street, Drummond Street, Euston Street, Cobourg Street, North Gower Street, Regnart Buildings and Stephenson Way, to allow extension of the station footprint westwards;
- permanent diversion of an 132kV extra high voltage electricity cable in Euston Street, Melton Street and Gordon Street, via North Gower Street, across Euston Road, into Gower Street and Gower Place;
- permanent diversion of a 42-inch water main from Park Village East via Prince Albert Road, Parkway and Regent's Park (for a short distance alongside Gloucester Gate Bridge). The diversion will then follow Albany Street, Robert Street across Hampstead Road, down the realigned Cobourg Street, the remaining southern end of Melton Street (which will form the access to the bus station) and across Euston Road;
- sewer works in the grounds of Maria Fidelis Convent (Lower) School with localised excavations to carry out relining of the sewer and make connections to the sewer network;
- permanent diversion of various utilities in Euston Road and Gordon Street to allow construction of the pedestrian subway under Euston Road, including the realignment of the Fleet Sewer along Euston Road;
- temporary diversion of utilities from Hampstead Road Bridge into a corridor through the Amptill Estate, across Lidlington Place and Harrington Square Gardens and back into Hampstead Road and Mornington Crescent;
- permanent and temporary diversions of various private services, such as gas and water mains (owned by LBC), within the Amptill Estate; and
- potential lengths of utilities to be diverted adjacent to Delancey Street include an 18-inch steel gas main, 66kV extra high voltage electricity cables, and 8-inch cast iron water mains, and a 30-way telecommunications duct.

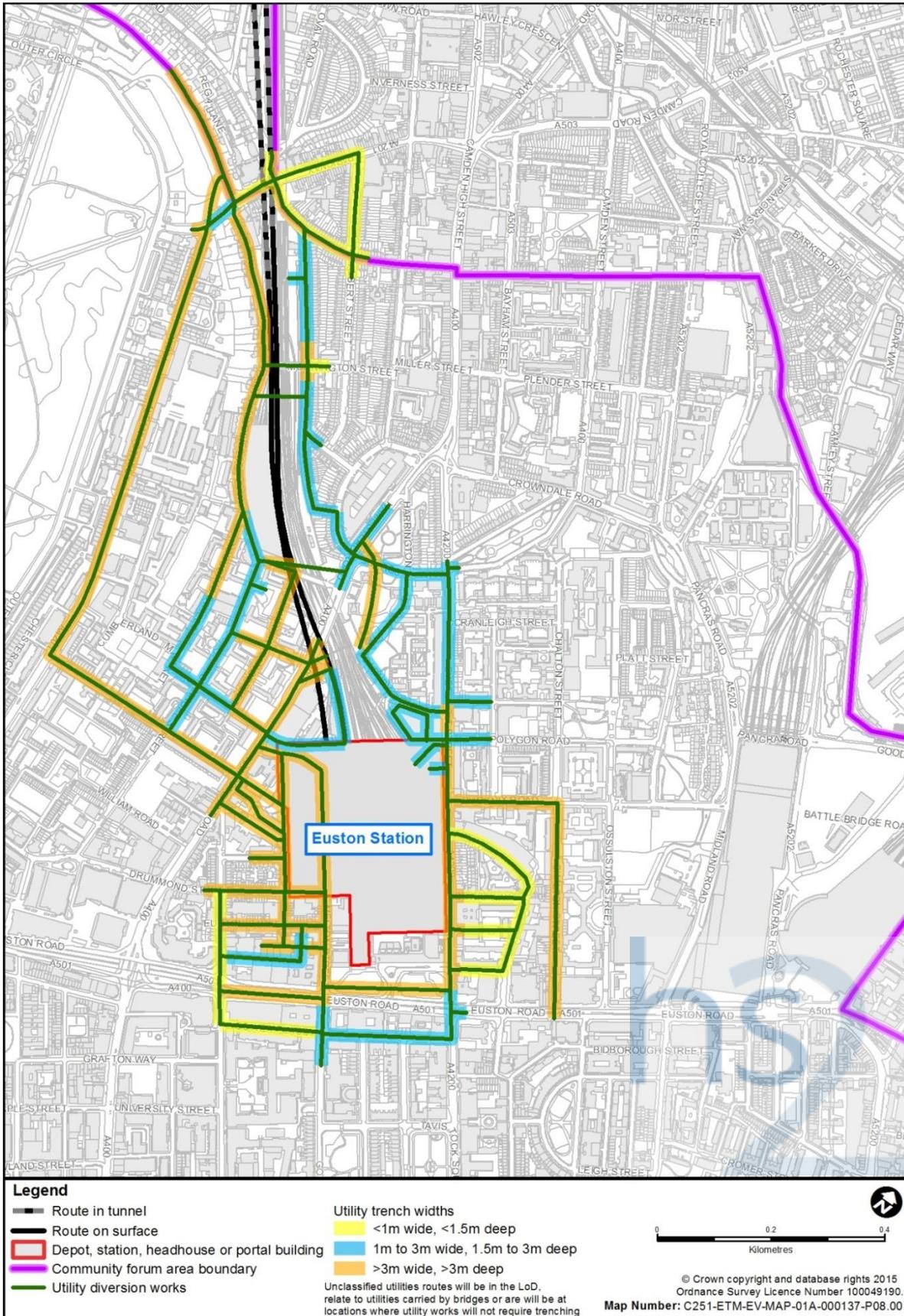
5.3.20 There will also be works to provide power supplies to the station from two substations. The proposed electricity substations are at Calshot Street off Pentonville Road, to the east of King's Cross station, and the St Pancras substation on Royal College Street.

5.3.21 In order to assess likely significant environmental affects, estimates have been made of the size of excavations necessary to complete the utility diversions and power reinforcements for the station. These are presented in Figure 8. This classifies the

streets in which utility works will take place into three categories, according to the scale of trenching needed:

- large excavations are classed as those greater than 3m wide or greater than 3m deep;
- medium excavations are those between 1-3m wide and 1.5–3m deep; and
- small excavations are those less than 1m wide and less than 1.5m deep.

Figure 8: Proposed utility diversions – size of trenches assumed for assessment



5.3.22 Discussions with utility providers are continuing, to confirm whether other utilities in these streets will need to be realigned away from the area of work, protected from the works by means of a concrete slab or similar or will have sufficient clearance from the

proposed works that they will not be affected. In the event that future surveys of utilities, for example, within Euston Road, confirm that it does not provide a suitable utilities diversion route, an alternative route will be considered which may need additional consents.

- 5.3.23 The assessment of utility diversions is based on mapped records. Uncharted utilities may be discovered during the works, and those known may not necessarily be in the location mapped. In both situations, additional diversion works may be required.
- 5.3.24 Wherever reasonably practicable, temporary connections for construction compounds will be made to existing utility services (i.e. electricity, water, data, sewerage and surface water drainage) to reduce the need for generators, storage tanks and associated traffic movements for fuel, water or sewage tankers.

Station, track and highway drainage

High speed station drainage

- 5.3.25 There are a number of different design standards that have been applied to the design of the drainage networks in and around the high speed station. In addition, the presence of infrastructure for potential future OSD which will be constructed as part of the revised scheme has also been factored into the drainage design.
- 5.3.26 The station and adjacent areas have been divided into sub-catchments, each with their own gravity collection, attenuation storage and pumping systems as follows:
- the high speed station footprint and structure excluding OSD – this catchment will drain to attenuation tanks in the station basement and it is assumed that future OSD will have its own dedicated drainage system and attenuation tanks (if required); and
 - hard and soft landscaping external to the high speed station footprint and structure – this catchment will drain to attenuation tanks within the soft landscaping.
- 5.3.27 Storm water ingress protection will be managed through a number of engineered measures that will include, but will not be exclusively limited to, incorporating storm water channel drainage at all building thresholds, ventilation shafts and at any further deck openings, but will not include additional attenuation storage in the high speed station basement. Flood defence barriers will be installed and landscaping designed to encourage storm water to discharge from the deck to surrounding areas. Managed overflows will be incorporated into the high speed station roof to discharge excess storm water onto the deck and away from deck openings to avoid water ingress into the high speed station.
- 5.3.28 The attenuation tanks will be pumped and discharged to a new Thames Water Utilities Limited (TWUL) combined sewer in Cobourg Street. The new sewer will connect to the combined Fleet Sewer, located in Euston Road.
- 5.3.29 Toilets and other facilities producing foul drainage in the high speed station will also discharge to the Fleet Sewer.
- 5.3.30 Attenuation tanks will also be required for new public realm, paved areas and streets to the south and west of the high speed station. These will be provided below these

areas close to the point of collection with either gravity or pumped discharge to adjacent TWUL sewers.

Conventional station drainage

- 5.3.31 The conventional station has an independent surface water management system and will be kept separate from drainage associated with the high speed station. The existing conventional station outfalls are to the east of the station in Eversholt Street and will be retained. Some works will be required to the conventional station drainage systems to ensure their functionality is maintained during the works.

Drainage of the high speed station approach

- 5.3.32 Surface water from the high speed station approach will either drain towards collection points at the station or near the tunnel portal. The majority of water will drain towards the station, where there will be attenuation tanks located in the station basement beneath the high speed platforms.
- 5.3.33 A smaller volume of water will drain towards the tunnels where it will be collected in an attenuation tank within the tunnel portal structure. Water will either be pumped to the TWUL sewer in Park Village East or be directed to the attenuation tanks in the high speed station basement.
- 5.3.34 Surface water that is directed to attenuation tanks in the high speed station basement will be pumped and discharged to new or adjacent TWUL sewers. The sewer will connect to the combined Fleet Sewer, located in Euston Road.
- 5.3.35 To ensure segregation of the high speed railway and conventional railway drainage, a wall will be constructed between the two. This will be an extension of the proposed retaining wall required due to the level difference between high speed and conventional tracks. In the event that the conventional railway is flooded, this wall will prevent flooding of the high speed railway. Where Line X is above the high speed tracks, a segregated drainage system will ensure that any surface water on Line X does not affect the high speed railway below.
- 5.3.36 Surface water associated with the decks in the station approach will be attenuated at deck level, prior to discharge to the TWUL sewers on Park Village East. There will be a low flood wall at the edge of the decks to prevent flooding of the high speed tracks below.

Drainage of the conventional station approach

- 5.3.37 Drainage of the conventional railway tracks will remain largely unaltered and will be segregated from the drainage in the high speed approach by the retaining wall between the high speed and conventional tracks. Line X and the conventional dive under will have an independent drainage system to ensure separation of conventional and high speed drainage systems. The existing conventional track outfalls are to the east of the station in Eversholt Street and will be retained. Some works may be required to the conventional track drainage systems to ensure their functionality is maintained.

Engineering and building works compounds

Introduction

- 5.3.38 Works will be coordinated from site compounds, which will include two main construction compounds in this area: the National Temperance Hospital main compound and the Podium main compound, supported by satellite compounds.
- 5.3.39 Main compounds will be used for core project management (engineering, planning and construction delivery), commercial and administrative staff as well as welfare for all personnel.
- 5.3.40 Satellite compounds will provide office accommodation and welfare facilities for smaller numbers of personnel.
- 5.3.41 General arrangements for the operation of site compounds, including security fencing, lighting, utilities supply, site drainage and codes of worker behaviour are set out in Volume 1, Section 6.6 of the main ES, and the draft CoCP, Section 5.
- 5.3.42 The establishment of construction compounds will be one of the first activities to take place. Hardstanding will be laid in all compounds, except where these are buildings. Security fencing and gates will be provided on the perimeter of each construction compound and around construction work sites. Fence type and construction will be appropriate to the level of security required, and visual impact.
- 5.3.43 The site perimeter will generally be fenced with 2.4m high solid hoardings, appropriately decorated. Where significant noise effects would be likely to arise, the height of hoardings will be raised to 3.6m, wherever practicable, along the edge of the construction site boundaries. In addition, where necessary, the hoardings will be altered in form to enhance acoustic performance. At locations where existing fencing might need to be removed or where there is no existing fencing, temporary wire mesh fencing or other suitable alternatives will be used.
- 5.3.44 All of the construction compounds and sites will be manned by security personnel and will be lit during the hours of darkness in accordance with the requirements of the draft CoCP and where reasonably practicable to minimise light pollution to the surrounding area.
- 5.3.45 Site buildings for offices and welfare will generally be of a temporary modular type and may be stacked up to six storeys to limit the area of land required. For works to the existing station and underground stations, it is proposed that an existing office building, the Podium, is used, which will minimise the number of temporary buildings for offices and welfare required in Euston Square Gardens.
- 5.3.46 There will only be limited space available at construction compounds for the storage of bulk materials (aggregates, structural steel and steel reinforcement), fabrication of temporary works equipment, finished goods, utilities equipment, plant and machinery and fuel.
- 5.3.47 The peak number of construction personnel at all construction sites at Euston is estimated to be approximately 2055 (plus an additional 400 HS2 Ltd project staff) in construction Stage A between 2022 and 2026, with a second peak of 2050 (plus an

additional 400 HS2 Ltd project staff) in construction Stage B1 between 2030 and 2033 working from a smaller number of compounds.

- 5.3.48 It is likely that specialised concrete plants will be required at Euston. Normal concrete for construction will be supplied from commercial concrete plants in London. One specialised facility will be located at ground level in the footprint of Grant Thornton House and One Euston Square and will supply sprayed concrete for lining of subsurface pedestrian links associated with the underground station. A second plant will be used to supply sprayed concrete for facing the barrette retaining walls to be constructed at Park Village East and the retaining walls along the west side of the high speed station. This is likely to be located at track level.
- 5.3.49 Mobile facilities for recycling demolition materials and aggregates for re-use (e.g. crushing, screening and grading plants) will be located adjacent to buildings during their demolition and moved as necessary to reduce on-site haulage.
- 5.3.50 The locations of site compounds are shown on Map CT-05-001 (Volume 2, CFA1 Map Book). The proposed use of each site compound is described below with an estimated duration of use, peak staff numbers and proposed vehicle access points. The highway access routes that will be used are addressed in Section 12.
- 5.3.51 Construction compounds will be in used at various stages of construction as summarised in Table 3.

Table 3: Summary of construction compound use in construction Stages A and B1 in CFA1

Name of compound	Period of Use	Changes in site layout and/or location
Stage A use only (2017 to 2026)		
Carriage Shed and Park Village East satellite compound	2016 to 2026	None
Mornington Street overbridge satellite compound	2016 to 2020	The compound may need to increase in size for short periods during the demolition and construction works.
A400 Hampstead Road overbridge (north) satellite compound	2016 to 2026	None
Lancing Street satellite compound	2018 to 2024	None
Gordon Street satellite compound	2017 to 2018 and 2021 to 2026	None
Park Village East (north) satellite compound	2018 to 2024	None

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Name of compound	Period of Use	Changes in site layout and/or location
Stage B1 use only (2026 to 2033)		
Melton Street satellite compound	2027 to 2033	None
Cobourg Street satellite compound	2027 to 2033	None
Stage A and Stage B1 use (2016 to 2033)		
National Temperance Hospital main compound	2016 to 2033	Changes in size for construction Stage B1, extending onto the completed deck north of the high speed station and reducing over the original National Temperance Hospital footprint.
Granby Terrace overbridge satellite compound	2016 to 2026 (Stage A) and 2026 to 2033 (Stage B1)	Reduces in size for Stage B1 with southern area no longer required as a construction compound.
Mornington Terrace sidings satellite compound	2016 to 2027	None
A400 Hampstead Road overbridge (south) satellite compound	2016 to 2033	None
The Podium main compound	2016 to 2033	None
Royal Mail NW1 delivery office satellite compound	2022 to 2033	Temporary office accommodation will be provided at the site between 2022 and 2033 facing onto Eversholt Street and built over the bus stands.
Euston Square Gardens (east) satellite compound	2016 to 2033	None
Euston Square Gardens (west) satellite compound	2016 to 2033	Changes in size and footprint during the construction period depending on the works being undertaken.
Euston forecourt satellite compound	2019 to 2033	Compound boundary will change to suit the ongoing works and access requirements.

Name of compound	Period of Use	Changes in site layout and/or location
Euston station satellite compounds	2016 to 2033	Compounds will change in location, size and use during the construction period.

National Temperance Hospital main compound

5.3.52 This construction compound will:

- be used from 2016 to 2033 (it will change in size and shape for construction Stage B1 extending onto the completed deck north of the high speed station and reducing over the original National Temperance Hospital footprint);
- have peak construction personnel numbers of approximately 1025 in both stages of the construction programme (including an additional 400 HS2 Ltd project staff for the early part of construction Stage A); and
- have vehicle access from A400 Hampstead Road.

5.3.53 This construction compound will be a strategic hub for core project management, technical, commercial and administrative staff for the site-wide high speed station and approach related works. There will be facilities for railway systems work during the early works on the conventional railway and for high speed railway fit-outs.

5.3.54 Initial set up of the construction compound will start in a reduced form in the existing courtyard of the National Temperance Hospital to allow the wider establishment of the site and enabling works. Full establishment will follow the demolition of the National Temperance Hospital in 2017, and it will remain in use, in part, until completion of the civil engineering works on the high speed station in 2033. It will have stacking modular buildings, which may be increased or decreased in size or configuration during the construction period, as necessary.

5.3.55 The construction compound will be the principal access point to the high speed station works, with a temporary ramp to the high speed track level. There will be some limited space for storage and lay down of materials, plant, machinery, small tools and equipment. Towards the end of the construction period it will be used for storage of materials, plant and equipment.

5.3.56 The construction compound will support the following works:

- the site-wide high speed station and approach works; and
- railway systems works during conventional railway enabling works and for high speed railway fit-out.

5.3.57 In construction Stage A, this compound will provide administrative and site management support to the railway installation works at Euston and in the Primrose Hill to Kilburn (Camden) area (CFA3).

5.3.58 On-site car parking will be provided only for a small number of essential light goods vehicles (LGVs).

5.3.59 The construction compound and associated offices will principally be used during core working hours but will be open 24 hours per day to support any working in the Euston area outside core working hours.

Granby Terrace overbridge satellite compound

5.3.60 This construction compound will:

- be used from 2016 to 2026 (construction Stage A) and then will reduce in size for construction Stage B1 (2026 to 2033);
- support up to 65 construction personnel; and
- initially have two vehicle accesses; the primary access being from A400 Hampstead Road via Robert Street and Stanhope Street, and the secondary access being from Hampstead Road via Robert Street, Stanhope Street, Mackworth Street and Harrington Street. After mid-2018, the majority of vehicle access will be from A400 Hampstead Road via Granby Terrace Bridge, until mid-2020, when the bridge will be completed and used for construction traffic but will remain closed to the general public. The bridge will reopen for public use in 2023.

5.3.61 The construction compound will support the following works:

- demolition of Stalbridge House and Granby House in 2017 and the three Regent's Park Estate residential blocks in early 2018;
- construction of the west side retaining wall around Hampstead Road Bridge; and
- demolition and reconstruction of Hampstead Road and Granby Terrace Bridges as well as associated utilities and highway works.

5.3.62 The construction compound will be partially operational from 2016 to facilitate access to the Carriage Shed and Park Village East satellite compound, before becoming fully operational in 2018 when the residential blocks on the Regent's Park Estate will be demolished. By 2023 the retaining wall will have been built and the bridges reconstructed. However, the construction compound will remain in operation until 2026 for storage of materials, plant and equipment for construction of the high speed station and underground station.

5.3.63 There will be bentonite silos on site, along with associated cleaning and pumping plant, for installing the west side retaining walls.

5.3.64 The construction compound will operate mainly during core working hours but will occasionally operate 24 hours per day for railway possession dependent works.

Carriage Shed and Park Village East satellite compound

5.3.65 This construction compound will:

- be used from 2016 to 2026 (construction Stage A);
- support approximately 165 construction personnel; and

- initially have vehicle access from A400 Hampstead Road via Robert Street and Stanhope Street. After mid-2018, the majority of vehicle access will be from A400 Hampstead Road via Granby Terrace Bridge. The bridge will open to all traffic in 2023.

5.3.66 The construction compound will support:

- demolition of the carriage sheds and siding;
- conventional railway enabling works;
- demolition and reconstruction of Mornington Street Bridge;
- construction of the Park Village East retaining wall, portal and high speed dive unders including the installation of ground anchors;
- conventional dive under remedial works;
- removal of excavated material from the station and station approach, portal and high speed dive under;
- tunnel portal and headhouse works, including installation of the auto-transformer station;
- construction of the decks over the high speed dive under and railway, south of Mornington Street Bridge; and
- high speed railway systems fit out.

5.3.67 The construction compound will be established in 2017 in order to demolish the carriage shed. There will be space for materials, plant and equipment storage, and fabrication of reinforcement cages used in barrette construction. Bentonite silos will be present and associated cleaning and pumping plant for the Park Village East barrette retaining wall construction. A temporary ramp for vehicles will be built from road level to track level.

5.3.68 The construction compound will operate predominantly during core working hours but will, on occasion, operate 24 hours per day for works dependent on railway possessions. During installation of barrettes in Park Village East, each barrette has to be concreted in a single operation. If this operation is interrupted or prolonged for any reason these works may extend beyond core working hours as set out in the draft CoCP.

Park Village East (north) satellite compound

5.3.69 This construction compound will:

- be used from 2018 to 2024 (construction Stage A);
- support approximately 40 construction personnel;
- will have vehicle access from Parkway to the north of Park Village East;
- support the movement of plant and material down into the adjacent railway cutting; and

- support the removal of excavated material generated in the railway cutting.

5.3.70 The construction compound will contain a conveyor and logistics platform. The logistics platform will be approximately 20m x 30m in area and will extend out from Park Village East over the railway cutting. This platform will be used to move materials by crane between track level in the adjacent railway cutting and street level in Park Village East. The conveyor will allow excavated material to be removed.

5.3.71 The compound will operate predominantly during core working hours. The northern part of the Park Village East carriageway will also be used as a laydown area for fabricating barrette reinforcement cages and as a crane site to construct the 10 most northerly retaining wall barrettes. The remaining barrettes will be constructed using cranes from track level within the railway cutting.

Mornington Terrace sidings satellite compound

5.3.72 This construction compound will:

- be used from 2016 to 2026 (in construction Stage A);
- support approximately 25 construction personnel in Stage A of construction and 25 in Stage B1 of construction; and
- have vehicle access from A400 Hampstead Road via Mornington Crescent, Clarkson Row and Mornington Terrace or via Mornington Crescent, Mornington Place and Mornington Terrace.

5.3.73 The construction compound will specifically support the conventional railway enabling works.

5.3.74 Plant, equipment and material will mainly be delivered and removed via the conventional railway corridor using road-rail plant and equipment. There will be minimal deliveries via Mornington Terrace. Pedestrian access to the site will be via an existing NR pedestrian gate off Mornington Terrace.

5.3.75 The majority of works will be carried out outside core working hours in railway possessions.

Mornington Street overbridge satellite compound

5.3.76 This construction compound will:

- be used in construction Stage A for four years from 2017 until 2020;
- support approximately 15 construction personnel; and
- have vehicle access from A400 Hampstead Road via Mornington Crescent, Clarkson Row and Mornington Terrace or via Mornington Crescent, Mornington Place and Mornington Terrace.

5.3.77 The construction compound will support:

- construction of a temporary pedestrian and utilities bridge south of Mornington Street Bridge and approach construction access ramps;
- relocation of utilities from the existing bridge to the temporary bridge;

- demolition of the existing bridge;
- piling and construction of east side abutment;
- placing bridge beams and constructing deck; and
- transfer of utilities back to the permanent bridge and removal of the temporary bridge.

5.3.78 The construction compound will occupy the western footway and half the width of the existing road adjacent to Mornington Street Bridge and the proposed temporary utilities bridge. During the bridge demolition and construction, the compound will be larger.

5.3.79 During short discrete periods of construction activity, Mornington Terrace may need to be closed to through traffic. The road will then access bi-directionally, from the north end of Mornington Terrace in and out from A503 Delancey Street and from the south end via Mornington Terrace, Clarkson Row (or Mornington Place) and Mornington Crescent.

5.3.80 For most of the period it is in use, the compound will operate during core working hours, but there may be occasional short periods when it operates at other times during railway possessions and utilities works. It will have limited space for offices, welfare facilities and storage.

A400 Hampstead Road overbridge (north) satellite compound

5.3.81 This construction compound will:

- be used from 2016 to 2026;
- support approximately 20 construction personnel; and
- have vehicle access from Hampstead Road.

5.3.82 The construction compound will support works to Hampstead Road Bridge and Granby Terrace Bridge including:

- construction of the temporary utilities bridges to north and south of Hampstead Road Bridge;
- relocation of utilities to the temporary bridges;
- demolition of Hampstead Road Bridge and Granby Terrace Bridge;
- reconstruction of Hampstead Road Bridge and Granby Terrace Bridge; and
- transfer of utilities back to Hampstead Road Bridge and removal of temporary bridges.

5.3.83 Apart from these works, the construction compound will also be used for storing materials, plant and equipment. The construction compound will operate during core working hours, but on occasion there will be work outside of these hours for rail possession when construction activities are on or adjacent to the conventional railway.

A400 Hampstead Road overbridge (south) satellite compound

5.3.84 This construction compound will:

- be used from 2016 to 2033 (in both stages of construction);
- support approximately 40 construction personnel; and
- have vehicle access from A4200 Eversholt Street via Barnby Street and the Ampthill Estate car park.

5.3.85 Use of this construction compound will vary depending on whether it is supporting Stage A or Stage B1 construction activities. In construction Stage A, the following works will be supported from this compound:

- construction of a temporary utilities bridge to the south of Hampstead Road Bridge;
- relocation of utilities to the temporary bridge;
- demolition of Hampstead Road Bridge;
- construction of foundations and construction of east side abutments and reconstruction of Hampstead Road Bridge; and
- transfer of utilities back to Hampstead Road Bridge and removal of temporary bridges.

5.3.86 In construction stages A and B1 (from 2024 to 2033), this compound will provide storage of materials and equipment as well as providing offices and welfare facilities.

5.3.87 The construction compound will operate predominantly during core working hours but will, on occasions, operate 24 hours per day for works dependent on the requirement for railway possessions.

Royal Mail NW1 delivery office satellite compound

5.3.88 This construction compound will:

- be used from 2022 to 2033 (in both stages of construction);
- support approximately 15 construction personnel and also accommodate 400 project staff;
- have vehicle access from A4200 Eversholt Street and Barnby Street; and
- provide storage for materials, plant and equipment.

5.3.89 The construction compound will support works including:

- demolition of the Royal Mail NW1 delivery office;
- construction of a bus turning area and the Eversholt Street taxi rank;
- relocation of utilities in Eversholt Street and surrounding streets;
- construction of a bus turning area and the Eversholt Street taxi rank

turnaround;

- relocation of utilities in Eversholt Street and surrounding streets;
- construction of bus stands and associated driver welfare facilities and project offices on the site; and
- relocation of utilities from the temporary utilities bridge back on to A400 Hampstead Road Bridge and removal of the temporary utilities bridges.

5.3.90 The construction compound will operate during core working hours, as well outside of these hours, on occasion, when railway possessions take place for works to bridges and to reduce daytime traffic congestion during utilities and road works. Bus turning and taxi turnaround will operate on a 24 hour basis.

Lancing Street satellite compound

5.3.91 This construction compound will:

- be used from 2018 to 2024 (in construction Stage A);
- support approximately five construction personnel; and
- have vehicle access from A4200 Eversholt Street via Lancing Street.

5.3.92 The construction compound will support ground settlement compensation works in advance of and during tunnelling for the LU works. A grouting shaft will be constructed to allow injection of grout from an array of horizontal tubes should ground settlement be detected. Storage on site will be limited but will include grouting materials.

5.3.93 The construction compound will operate during core working hours, prior to tunnelling works commencing. Subsequently, grouting will need to respond to settlement, as it occurs, which could be during the day or night, until the risk of settlement has been removed.

The Podium main compound

5.3.94 This construction compound will:

- be used from 2016 to 2033 (throughout both stages of construction);
- support peak construction personnel of approximately 690 in both construction stages; and
- have no vehicle access for staff but will have servicing and maintenance access from Eversholt Street, as at present.

5.3.95 The Podium will be a strategic hub for core project management (engineering, planning and construction delivery), commercial management and administrative staff for the works. The existing building may need to be refitted to provide better pedestrian access and facilities suitable for construction management. One Eversholt Street (also known as "The Tower") has also been included within the land required to allow access and modification to building facilities and equipment that may be shared

with the Podium. Otherwise, One Eversholt Street will not be directly affected by the revised scheme.

- 5.3.96 Welfare facilities will be provided such as training, induction, canteen and washing/drying storage facilities. There will also be occupational health facilities, with qualified health professionals in attendance.
- 5.3.97 Activities managed from the the Podium main compound will increase as high speed station construction progresses from west-east and the activities managed from the National Temperance Hospital main compound decrease. Activities managed from this compound are likely to include the following:
- constructing pedestrian links from the high speed platforms to the new LU ticket hall;
 - constructing the new underground station ticket hall, escalator declines, lift shafts and passages to underground platforms;
 - systems and architectural fit-out of the underground station;
 - constructing the Euston Road subway, Gordon Street entrance and access to Euston Square underground station;
 - site wide utilities work;
 - high speed station construction;
 - constructing the bus station; and
 - restoring and landscaping Euston Square Gardens.
- 5.3.98 The Podium main compound will be in use as site offices up to 24 hours a day, managing works across the station and approach, in support of the National Temperance Hospital main compound.

Euston Square Gardens (east) satellite compound

- 5.3.99 This construction compound will:
- be used from 2016 to 2033 (throughout both stages of construction);
 - support approximately 25 construction personnel; and
 - have vehicle access from A4200 Eversholt Street.
- 5.3.100 This construction compound will principally be used for the local storage of materials, plant and equipment associated with the works to the high speed and conventional parts of Euston station, Euston underground station, Euston Road subway and Euston Square underground station connection.
- 5.3.101 The construction compound will also support the following utility diversion works within its footprint:
- a 36-inch gas main;
 - a 42-inch water main;

- communication and power cables;
- a 1.5m diameter foul sewer; and
- a 1200mm by 800mm foul sewer.

5.3.102 The bus station remodelling will be supported from this construction compound as will external works to the Euston Road station entrance and landscaping of the station forecourt and gardens. In addition, the compound will support the construction of an underground surface water drainage attenuation tank for the high speed station.

5.3.103 The construction compound will operate during core working hours, as well as outside these hours for supporting tunnelling, station possession and Euston Road highway works.

Euston Square Gardens (west) satellite compound

5.3.104 This construction compound will:

- be used from 2016 to 2033 (throughout both stages of construction);
- support approximately 20 construction personnel; and
- have vehicle access from Euston Road or Melton Street.

5.3.105 The construction compound will be established for early utilities advanced works in 2016 and then works to the high speed (western end) and conventional parts of Euston station, Euston underground station, Euston Road subway and Euston Square underground station connection. The construction compound will change in size and footprint throughout the construction period depending on the nature of the works being undertaken. It will be in use until 2033.

5.3.106 The construction compound will provide:

- limited facilities for staff, security personnel and site operatives;
- construction access into the high speed station works and parts of the existing station, and Euston underground station; and
- a hub for managing material removal from the excavations associated with the Euston Road subway and underground station passages, links and connections.

5.3.107 The construction compound will also support the following works:

- utility works in Euston Road;
- utility works in Euston Square Gardens including, 1.5m diameter foul sewer, 42-inch water main, 36-inch gas main, and telecommunications and power cables;
- demolition of Grant Thornton House and One Euston Square;
- piling, construction and fit-out of the high speed part of Euston station including retaining walls, concourse and subsurface links between high speed platforms and underground station ticket hall;

- Euston Road subway and the Euston Square connection to Euston Square underground station Circle, Hammersmith & City and Metropolitan lines;
- reconfiguration of the bus station; and
- external works to the Euston Square underground station entrance and landscaping of the station forecourt and Euston Square Gardens.

5.3.108 The construction compound will operate during core working hours, as well as outside these hours for supporting tunnelling, some station works and the Euston Road highway works.

Melton Street satellite compound

5.3.109 This construction compound will:

- be used from 2027 to 2033 (in construction Stage B1);
- support approximately 40 construction personnel; and
- have a vehicle entrance from A501 Euston Road via Melton Street.

5.3.110 The construction compound will support the following works:

- construction of the high speed and LU station substructure and superstructure;
- construction of the platform circulation area and spine building;
- fit-out of the high speed station; and
- fit-out of the basement areas.

5.3.111 The construction compound will provide offices, staff welfare facilities and limited storage of materials, plant and equipment.

5.3.112 The construction compound will operate during core working hours, but on occasion there will be work outside of these hours for rail possession when construction activities are on or adjacent to the high speed railway.

Euston forecourt satellite compound

5.3.113 This construction compound will:

- be used from 2019 to 2033 (in both stages of construction);
- support approximately 25 construction personnel; and
- have limited vehicle access from A501 Euston Road via the existing bus station outside normal working hours.

5.3.114 The construction compound will support the following works:

- construction of the high speed and LU station substructure and superstructure;
- construction of the central circulation area and spine building; and
- fit-out of the high speed station.

5.3.115 The construction compound boundary will change during the programme to suit the ongoing works and access requirements. The compound will provide offices, staff welfare facilities and limited storage of materials, plant and equipment.

5.3.116 The construction compound will operate during core working hours, but on occasion there will be work outside of these hours for rail possession when construction activities are on or adjacent to the high speed railway.

Cobourg Street satellite compound

5.3.117 This construction compound will:

- be used from 2027 to 2033 (in Stage B1 of construction);
- support approximately 40 construction personnel; and
- have a vehicle entrance and exit from A501 Euston Road via Melton Street or via the A400 Hampstead Road via the realigned Cobourg Street (constructed in Stage A).

5.3.118 The construction compound will support the following works:

- construction of the high speed station substructure and superstructure;
- construction of the platform level passenger circulation area and spine building; and
- fit-out of the high speed station.

5.3.119 The construction compound will provide offices, staff welfare facilities and limited storage of materials, plant and equipment.

5.3.120 The construction compound will operate during core working hours, but on occasion there will be work outside of these hours for rail possession when construction activities are on or adjacent to the high speed railway.

Gordon Street satellite compound

5.3.121 This construction compound will:

- be used from 2017 to 2018 and 2021 to 2026 (in construction Stage A);
- support approximately 20 construction personnel;
- have a vehicle entrance from A501 Euston Road, Endsleigh Gardens or Gordon Street; and
- have a vehicle exit to A501 Euston Road, Endsleigh Gardens or Gower Place.

5.3.122 The construction compound will support the following works:

- utility works in Euston Road and surrounding roads;
- temporary traffic management in Euston Road and surrounding areas; and
- construction of the Euston Road subway, Gordon Street entrance and access to Euston Square underground station.

5.3.123 The construction compound will be established for utilities works which occur in 2017 and late 2021. It will then be used between 2024 to 2026 for construction of subways and the accesses to Euston Square underground station. The compound will be used for storage throughout the entire construction period at Euston.

5.3.124 The construction compound will operate during core working hours as well as outside of these hours for tunnelling works and Euston Road highway and utility works.

Euston station satellite compounds

5.3.125 These construction compounds will:

- be used from 2016 to 2033 (in both stages of construction) during periods of railway systems works and will not be present at all times;
- be located centrally in the conventional station during conventional rail enabling works in construction Stage A;
- move west in construction Stage B1 when works are undertaken to the western conventional rail platforms;
- will move to high speed platforms under construction (7 to 11 for the high speed railway systems fit out) towards the end of construction Stage B1; and
- support approximately 20 personnel.

5.3.126 The construction compounds will provide limited offices and facilities, as well as storage of small plant and equipment. The construction compound will change in size and use throughout the construction period. Plant equipment and materials will be delivered using the railway.

5.3.127 These construction compounds will support the railway systems enabling works to the conventional track alignment as well as later high speed railway system final fit-out.

5.3.128 These construction compounds will operate during core working hours as well as outside of these hours for rail systems work during station possessions.

Juniper Crescent satellite compound

5.3.129 This construction compound is in the Camden Town area (CFA2), but it will be used periodically from 2016 to 2033 to support both high speed and conventional railway works in the Euston area. This satellite construction compound will be used for road-rail plant access to the network, storage of materials together with welfare facilities for security and site operatives. See SES2 and AP3 ES Volume 2: Camden Town for more information about this compound.

Willesden Euroterminal main compound

5.3.130 This construction compound is in the Kilburn (Brent) to Old Oak Common area (CFA4), but will be used to support conventional railway works in the Euston area periodically from 2016 to 2033. It will be used for material deliveries and train stabling for conventional rail modification works at Euston. It will provide worker welfare facilities, access to the rail network, signing on point, material handling and support other satellite compounds. See CFA4, Volume 2 report of the main ES and SES2 and

AP3 ES for more information about this compound and details of construction activities up until the end of 2026.

F Sidings satellite compound

- 5.3.131 This construction compound is in the Northolt Corridor area (CFA5), but it will be used periodically to support conventional railway works in the Euston area from 2016 to 2033. See CFA5, Volume 2 of the main ES and SES2 and AP3 ES for more information about this compound and details of construction activities up until the end of 2026.

Calvert Infrastructure Maintenance Depot (IMD)

- 5.3.132 Calvert IMD (located in CFA13, Calvert, Steeple Claydon, Twyford and Chetwode) is being provided as the principal maintenance facility for the high speed railway. An area within the Calvert IMD will be used to support the Stage B1 railway systems installation works at Euston in 2032 and 2033. This will involve materials storage and transfer to works trains and these activities are the same kinds of maintenance and renewals as those which will be undertaken from this depot, in due course, on other parts of the high speed railway.

Highway closures and construction traffic access

- 5.3.133 The revised scheme will result in permanent road closures as a result of an extended station footprint or permanent highway works as set out in Table 4.

Table 4: Permanent road closures without replacement

Location	Description of closure
Cardington Street	Permanently closed for its entire length.
Melton Street (south of Cardington Street)	Permanently closed from the junction with Drummond Street to new bus station access.
Stephenson Way (northern end)	Northern end permanently closed at the junction with Euston Street. Connection will be maintained with realigned Cobourg Street.
Drummond Street (eastern end) ⁴¹	Permanently closed between Cardington Street and Cobourg Street. Connection will be maintained with realigned Cobourg Street.
Euston Street (eastern end)	Permanently closed between Cardington Street and Cobourg Street.

⁴¹ The revised scheme will provide connections between Drummond Street, Euston Street and the realigned Cobourg Street.

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Location	Description of closure
Varndell Street (eastern end)	Permanently closed to vehicles at the junction with A400 Hampstead Road, because of level changes. Pedestrian and cycle access may be maintained.
Harrington Street (northern end)	Permanently closed at the junction with Granby Terrace.
Hampstead Road (not the A400 Hampstead Road)	A minor road called Hampstead Road which is not the A400 Hampstead Road, permanently closed between junction with Cardington Street and A400 Hampstead Road.
Bus station access	Permanently closed from the junction with A501 Euston Road across Euston Square Gardens to the bus station.
Gordon Street (northern end)	Permanently closed to vehicles between A501 Euston Road and Endsleigh Gardens. Pedestrian and cycle access will be maintained.

5.3.134 The revised scheme will result in the following permanent road closures and diversions to new alignments as a result of the enlarged station footprint or railway works as set out in Table 5.

Table 5: Permanent road closures with replacement

Location	Description of closure	Approximate duration of closure
Cobourg Street	Permanently closed for its entire length and rebuilt on an extended and widened alignment.	2017-2026
A400 Hampstead Road	Existing bridge is to be demolished. Bridge to be rebuilt on an altered vertical and horizontal alignment.	2019-2023
Granby Terrace Bridge	Existing bridge is to be demolished. Bridge to be rebuilt on a slightly altered vertical and horizontal alignment.	2017-2023 ⁴²

5.3.135 The A400 Hampstead Road Bridge currently carries a six-lane road. Reconstruction will involve removing one half of the width and replacing that, before repeating for the other half. Throughout reconstruction, it will be possible to keep one lane of traffic

⁴² The bridge will be completed in mid 2020 but will remain closed to the public until 2023. In the interim period it will be used for construction traffic.

open in each direction including access for pedestrians. Two temporary utilities bridges will be provided during construction.

- 5.3.136 Generally, where roads will be affected by the construction of the revised scheme, the strategy to mitigate this will be to reduce disruption resulting from highway works. This will be carried out by implementing well-managed, phased construction involving either permanent or temporary realignments or temporary diversions.
- 5.3.137 Construction of the revised scheme will result in long-period temporary road closures as shown in Table 6. Arrangements will be made to provide satisfactory alternative access arrangements during road closures which will be kept to as short a duration as reasonably practicable.

Table 6: Long period temporary road closures

Location	Description of closure	Approximate duration of closure
Mornington Street Bridge	To be demolished and rebuilt on its current alignment. A temporary shared utilities, pedestrian and cycle bridge will be available during construction.	2017-2022
Park Village East	Closed to vehicles in sections between its junction with Parkway to about 30m south of Mornington Street Bridge.	2017-2022
Drummond Street	Closed at the junction with Cobourg Street.	2017-2026
Euston Street	Closed at the junction with Cobourg Street.	2017-2026
Starcross Street	Closed at the junction with Cobourg Street.	2017-2026
Mornington Crescent	Closed at the junction with Hampstead Road.	2020-2022
Stephenson Way	Closed from the junction with Euston Street for part of its length.	2017-2026

- 5.3.138 In addition to the long-period closures shown in Table 6, Prince Albert Road will be closed to vehicles at the junction with Parkway for approximately four months in 2017 for utility works.
- 5.3.139 Works to construct the subsurface link to Euston Square underground station will require the permanent diversion of various utilities in Euston Road. The proposed pedestrian routes under Euston Square Gardens and across Euston Road and the connections to the Euston Square underground station platforms will be constructed using open cut excavation techniques. Construction will be in phases moving across the road, in order to maintain two lanes of traffic in each direction.
- 5.3.140 Designated off-street parking in the Amphill Estate will be lost temporarily during utility works. Similarly, on-street parking in Park Village East will be lost temporarily during the west retaining wall and Line X reinstatement works. All parking in these areas will be reinstated after the works are complete.

Footpath, cycleway and bridleway diversions

- 5.3.141 There are four paths⁴³ in the Euston area which will be permanently affected by the revised scheme:
- the path leading into St James's Gardens from Hampstead Road will be permanently closed and then replaced through the forecourt at the northern station entrance;
 - part of the pedestrian section of Harrington Street will be permanently closed but replaced as part of public realm at the northern end of the high speed station; and
 - two paths across Euston Square Gardens, (one to the east and one to the west) will be permanently closed and then reprovided later as new routes but with slightly altered alignments.
- 5.3.142 A pedestrian route across the front of the conventional station and high speed station construction area and through to streets to the west of the station will be maintained throughout the construction period. The route will vary depending on the construction activity taking place at any particular stage of construction. In addition, pedestrians and cyclists will be able to use Hampstead Road Bridge and the temporary utilities bridge to the south of Mornington Street Bridge between 2018 and 2022.

Construction traffic and access

- 5.3.143 Access points to the construction compounds have been described in relation to each compound. The traffic flows and routes that will be used to and from these access points are assessed in Section 12.
- 5.3.144 At Euston, it has been assumed, as a reasonable worst case, that all excavated material and demolition arisings will be transported outside London by road. However, there may be opportunities for a limited volume of excavated material to be transported by rail, but this is constrained by lack of space for sidings and the division of the excavations into two separate stages. Further work is being undertaken to explore effective ways to remove a greater proportion of excavated materials by rail.
- 5.3.145 Some material and equipment for rail construction and systems will be brought in by rail, but the majority of building materials for the station and other works will have to be brought in by road.
- 5.3.146 An off-site lorry holding area will be provided in part of the ZSL London Zoo coach park in Regent's Park, immediately north of Gloucester Gate Bridge. This area is identified within the land required on the Bill Plans and, subject to agreement with the Crown Estate, will be used intermittently during periods of construction activity between 2016 and 2033. Replacement car parking will be provided until the end of 2033 after which the alternative parking area will be reinstated to its existing condition.

⁴³ These have been treated in the same way as PRoW, since there is no definitive map of public rights of way in London.

Construction waste and materials

- 5.3.147 The revised scheme will result in changes to the quantities of construction waste generated in CFA1 compared with the original scheme. However the route-wide SES2 and AP3 design changes are expected to result in a net reduction in waste generation. These are not therefore considered to be likely to result in any new or different significant route-wide effects, and as a result waste has been scoped out. See SES2 and AP3 ES Volume 3, Section 7 for further information.
- 5.3.148 Forecasts of the amount of construction, demolition and excavation waste and worker accommodation site waste that will be produced during the construction of the revised scheme have been prepared and are presented in Table 7.
- 5.3.149 The majority of excavated material generated across the Hs2 Phase One scheme will be reused as engineering fill material or in the environmental mitigation earthworks of the revised scheme, either with or without treatment. However, the excavated material generated from the Euston area will need off-site disposal. This may have potential for reuse on other projects, with any remaining material going to permitted landfill sites. Geographical and logistical constraints mean that this material cannot be reused elsewhere on the revised scheme. The excavated material from Euston represents a proportion of the total quantity of surplus excavated material that will require off-site disposal.
- 5.3.150 Table 7 shows the quantity of surplus excavation waste to be disposed to landfill as zero, since this table is only intended to report contaminated excavated material that is chemically unsuitable for re-use within the revised scheme. No such material will be generated in the Euston area. The quantities of demolition, construction and worker accommodation site waste that will be reused, recycled and recovered (i.e. diverted from landfill) have been based on the landfill diversion performance of similar projects as follows:
- demolition waste: 90%;
 - construction waste: 90%; and
 - worker accommodation site waste: 50%.
- 5.3.151 The quantities of demolition, construction and worker accommodation site waste from the revised scheme in CFA1 that will require off-site disposal are shown in Table 7.

Table 7: Revised scheme: Estimated construction, demolition and excavation materials generated in CFA1

Type of material	Estimated material quantities that will be generated (tonnes)	Estimated quantity of waste for off-site disposal to landfill (tonnes)
Excavation	2,474,296	0
Demolition	328,135	32,814
Construction	642,498	64,250

Worker accommodation	No worker accommodation in CFA1	0
TOTAL	3,444,929	97,064

5.4 Construction staging and programme

Construction staging

Overview

- 5.4.1 The Euston construction programme commences in 2016 and will be completed in 2033. The first part of the high speed station, construction Stage A, will be completed in 2026 for the opening of Phase One of high speed services. The second part of the high speed station, construction Stage B1, will be completed in 2033 for the planned opening of Phase Two of high speed services in 2033. Throughout construction, the conventional station will remain operational as will the LU services and connections⁴⁴. Certain advanced works, mainly utility diversions and enabling works on the existing railway, are planned to start in 2016, subject to any necessary agreements and consents.
- 5.4.2 The construction programme at Euston is complex and will be subject to further detailed refinement during detailed design post-Royal Assent. The programme has been designed as two main construction stages to take account of the operational needs of the conventional railway and station including, in particular:
- the need to maintain a minimum of 16 operational platforms for conventional rail services up until the opening of Phase One of HS2 in 2026, with a minimum of 11 operational platforms for conventional services from 2026 onwards;
 - maintenance of pedestrian flows;
 - temporary taxi arrangements;
 - local traffic management; and
 - maintenance of station logistics and servicing.
- 5.4.3 An indicative construction programme that identifies periods for each core construction activity in this area in each of the construction stages is provided in Figure 9a – Stage A construction and Figure 9b – Stage B1 construction and operation. Figure 9a shows the main Stage A works required to complete the western part of the high speed station allowing Phase One of HS2 to open at the end of 2026 using six high speed platforms. The Stage B1 programme (Figure 9b) shows the remaining works that will be undertaken between 2026 and 2033 to complete the high speed station including a further five high speed platforms.
- 5.4.4 A sequence of staged construction phasing diagrams is provided in Figures CT-20-005 to CT-20-011 (Volume 2, CFA1 Map Book). The diagrams illustrate how works activities will be distributed spatially across the Euston area during the construction

⁴⁴ There will be periods when LU trains will not stop at Euston and there will be reduced passenger interchange on LU during these periods. There will also be periods when the conventional railway will be affected by possessions when construction works in close proximity to the railway will be undertaken and it will be necessary to temporarily close tracks for safety reasons.

programme. These provide an indication of the pattern of construction work and confirm that, in most areas of the construction sites, works will not be continuous throughout the construction period. They show where construction is being undertaken at selected dates/stages during the construction process. Where construction is being progressed, these areas will be closed off to the public.

- 5.4.5 Construction sequencing will be managed to provide for pedestrian movements through and around the works. There will be ongoing changes to passenger routes through and around the existing conventional station and in the vicinity of the high speed station works to meet the requirements for phased construction of the revised scheme.

Figure 9a: Activity based indicative construction programme summary – construction Stage A works 2016-2026

Construction Activity	2016 quarters				2017 quarters				2018 quarters				2019 quarters				2020 quarters				2021 quarters				2022 quarters				2023 quarters				2024 quarters				2025 quarters				2026 quarters							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Advance Works (including key utility diversions)																																																
Construction compound set up ⁴⁵	/																																															
Demolitions																																																
Conventional railway enabling works																																																
Utility works Cobourg Street																																																
Utility works Albany Street																																																
Utility works Prince Albert Road																																																
Utility works Park Village East and Mornington Street																																																

⁴⁵ Melton Street and Cobourg Street satellite compounds are set up at the beginning of Stage B1.

Construction Activity	2016 quarters				2017 quarters				2018 quarters				2019 quarters				2020 quarters				2021 quarters				2022 quarters				2023 quarters				2024 quarters				2025 quarters				2026 quarters			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Utility works Eversholt Street																																												
Utility works Euston Square Gardens																																												
132kV diversion from Gower Place/Gower Street																																												
Utility works Cardington Street and Melton Street																																												
Utility works Harrington Street area																																												
Utility works Ampt Hill Estate																																												
Utility works Euston Road ⁴⁶																																												
Hampstead Road Bridge																																												

⁴⁶ This is the period when traffic management will be in place and disruption to pedestrians is possible between Q2 2017 to Q1 2025.

Construction Activity	2016 quarters				2017 quarters				2018 quarters				2019 quarters				2020 quarters				2021 quarters				2022 quarters				2023 quarters				2024 quarters				2025 quarters				2026 quarters							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Remove temporary utility bridges and complete track systems																																																
Granby Terrace Bridge																																																
Divert utilities off Granby Terrace Bridge																																																
Demolish Granby Terrace Bridge																																																
Reconstruct Granby Terrace Bridge Deck and Approaches																																																
Open Granby Terrace Bridge for public use after completion of Hampstead Road Bridge works																																																
Mornington Street Bridge																																																

Construction Activity	2016 quarters				2017 quarters				2018 quarters				2019 quarters				2020 quarters				2021 quarters				2022 quarters				2023 quarters				2024 quarters				2025 quarters				2026 quarters							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Construct entrance to underground in Gordon Street																																																
Rail infrastructure and systems works																																																
Conventional railway works including overhead line equipment (OLE) (for bridge works) ⁴⁷																																																
High speed rail systems fit out in station and commissioning																																																

⁴⁷ The OLE works extend into Q2 2027 in construction Stage B1.

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Figure gb: Activity based indicative construction programme summary – construction Stage B1 2026 to 2033

Construction Activity	2027 quarters				2028 quarters				2029 quarters				2030 quarters				2031 quarters				2032 quarters				2033 quarters			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
High speed part of Euston station																												
Clearance and demolition ⁴⁸	■	■	■																									
Foundations				■	■	■	■	■	■	■	■	■	■															
Excavations and construct substructure										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Construct superstructure																■	■	■	■	■	■	■	■	■	■	■	■	■
Station fit out																												
Commissioning																												
Conventional rail part of Euston station																												
Decommissioning and removal of existing part of station platforms 14-18 ⁴⁸	■	■	■	■																								
Main station demolition west of existing platform 13		■	■	■																								
Main station reconfiguration			■	■	■	■	■																					
Euston underground station																												
Enabling (existing platforms, cabling and signalling) and cross passage connections																												
New ticket hall construction																												
Fit-out and installation of escalators and lifts																												
Commissioning																												
Other works																												
Bus station																												
Final reinstatement of Euston Square Gardens																												

⁴⁸ Commencing in Q3 2026 in construction Stage A.

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Construction Activity	2027 quarters				2028 quarters				2029 quarters				2030 quarters				2031 quarters				2032 quarters				2033 quarters							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Construct northern taxi facility, car park and open space																																
Rail infrastructure and systems works																																
High speed rail systems fit-out in station and commissioning ⁴⁹																																

5.4.6 The programme is influenced by many factors including the following main requirements or constraints:

- the commencement of utility works in July 2016;
- the grant of Royal Assent in December 2016;
- the commencement of enabling works by NR in December 2016;
- demolition activities commencing in June 2017;
- the main station construction works commencing in April 2018;
- closure of Line X from December 2018 until December 2021;
- arrival of the first tunnel boring machine (TBM) at the reception chamber in the Euston tunnel portal in July 2022;
- the start of railway systems installation in June 2023;
- HS2 Phase One opening in December 2026; and
- completion of the high speed station and HS2 Phase Two opening in December 2033.

5.4.7 There will be careful coordination of the works to ensure continuous operation of the conventional station and train services as well as the flow of passengers arriving on classic services and underground trains. It is likely to be necessary to reroute passengers on a number of occasions to allow works to progress.

Station approach

5.4.8 The majority of works in the approach will be undertaken between 2017 and 2026 (in construction Stage A) and will include the completion of all bridge works as well as construction of the following elements:

- a new high speed dive under (north and south in 2016 to 2024);
- the west side retaining walls (including the Park Village East retaining wall and

⁴⁹ It is likely that there will be a phased handover of access for rail systems works within the high speed station and these works could commence up to a year earlier than shown.

ground anchors (from 2017 to 2022); and

- the tunnel portal/TBM reception chamber (from 2018 to 2024).

5.4.9 It will also be necessary to undertake modifications to the conventional tracks and railway systems in the station approach. This will include works to the existing conventional dive under, closure of Line X for three years between 2018 and 2021 followed by its reinstatement above the high speed tracks, diversion of utilities in Park Village East and construction of temporary utilities bridges to the north and south of Hampstead Road Bridge and south of Mornington Street Bridge.

5.4.10 An access ramp will be created to allow vehicular access from road level down to the carriage sidings.

High speed station

5.4.11 Works to construct the high speed station will include:

- in construction Stage A (2017 to 2026)
 - diversion of utilities from within the high speed station footprint and diversion of utilities in and around the Euston station area including works on utilities to support future potential OSD;
 - sequential demolition of buildings to the south and west of the existing station and Melton Street (including the demolition of Grant Thornton House and One Euston Square and the existing ramp to the parcel deck off Cardington Street);
 - construction of the high speed station, which will be phased from south to north commencing with the installation of retaining walls along the northern, eastern, western and southern boundaries of the high speed station footprint. It will be necessary to provide retaining walls⁵⁰ during construction Stage A to retain the differences in levels and to facilitate the excavation of the new service and logistics basement and first six platforms;
 - the installation of drainage behind the majority of retaining walls, under slabs and where rapid swelling of the London Clay could occur following excavation;
 - construction of new entrances and escalators to provide access to underground stations. There will be excavations across Euston Square Gardens and Euston Road to provide the subsurface link from the Euston underground station ticket hall to the west end of the Northern line (Charing Cross branch) and to the new Metropolitan and Circle line ticket hall (Euston Square underground station) at Gordon Street. This will also provide fire access/escape provisions; and
 - construction of a new ventilation building⁵¹ with emergency evacuation provision at the southern end of Cobourg Street and an emergency evacuation building close to the western Cobourg Street high speed station entrance, and

⁵⁰ Where these are temporary structures they will be partially demolished as construction progresses in an easterly direction in construction Stage B1.

⁵¹ Cobourg Street ventilation shaft – this ventilation shaft building will replace two existing shafts serving LU and will also contain one of the LU firefighting / escape routes and a substation.

- in construction Stage B1 (2026 to 2033)
 - completion of the service and logistics basement and remaining five high speed platforms and tracks using the same south to north sequential construction methods as described for Stage A;
 - permanent retaining walls beneath the high speed station providing ground support along the line of the retaining structures and the primary structure for the main basement, LU ticket halls and passageways and the underground station roof. Ancillary works for potential OSD will be integral to the construction of the high speed station and foundations for working decks;
 - installation of deep foundations including ground anchors, tension piles and piled and barrette retaining walls, some of which will extend down to approximately – 15m OD into the Thanet Sand. In some locations, they may extend down to – 40m OD into the Chalk;
 - a new vehicle access ramp which will be constructed to provide access to the high speed station service and logistics basement from the Hampstead Road Bridge. This will be constructed between 2030 and 2032 i.e. at the end of construction Stage B1;
 - a taxi pick up and drop off facility and open space which will be constructed across the deck to the north of the high speed station, and Cobourg Street will be realigned; and
 - creation of subsurface connections with escalators connecting to the high speed concourses, platforms and the eastern ends of the Victoria line and Northern line (Bank branch). The latter will be at a deep level beneath buildings on Eversholt Street, including Euston House. A compensation grouting shaft in Lancing Street will be used to control settlement associated with these works.

5.4.12 It is likely that the station structure up to and including concourse level will be built from concrete. Precast concrete beams will be adopted where possible to simplify construction, alternatively, concrete beams will be cast in situ. The station structures above concourse level are likely to be either steel-framed or concrete and will include the station facilities and retail areas. The spine building which accommodates the majority of the station operational facilities is sited partially above the new concourse to LU services. This structure will be of standard construction of either steel or concrete. Roofs over the station concourse and platform areas will be partly glazed to provide appropriate levels of natural light. The station will have substantial plant installed for escalators and lifts, heating, cooling and other services.

Conventional station

5.4.13 Modification of the conventional station platforms during construction Stage A will involve:

- reconfiguration of some of the existing platforms and track layout;
- construction of a new pedestrian ramp to platforms 1, 2 and 3;
- creation of an additional platform between platforms 15 and 16;

- removal of the basement access ramp off Cardington Street/Melton Street, closure and relocation of the taxi rank;
- demolition of the north west access ramp to the parcels deck;
- demolition of an internal wall; and
- retention of the remaining platforms.

5.4.14 In construction stage B1, existing platforms 14 to 18 will be closed to make space for construction of the eastern side of the high speed station.

5.4.15 Other works associated with the existing conventional station structure in Stages A and B1 will involve:

- demolition and modification of part of the parcels deck;
- installation of temporary and permanent supports to station structures; and
- demolition of the western side of the station structure and construction of a new western wall.

5.4.16 NR has advised that their preferred new location for the Euston maintenance delivery unit is off site, with a rapid response unit within the existing station. The rapid response unit will be relocated to the top level of the existing station north wing building, adjacent to Hardwick House, on the east side of the conventional station vehicle access.

Euston and Euston Square underground stations

5.4.17 The requirements for Euston underground station during construction of the high speed station include the provision of a fully functioning station during as much of the work as possible i.e. access to all lines and sufficient circulation space. Ventilation shafts affected by the station works will be relocated and new ventilation shafts provided where necessary.

5.4.18 The high speed platform passenger circulation area will provide step-free access to the existing centrally located LU ticket hall via a new LU circulation area which will be at the same level as the existing LU interchange concourse level (Figure 7). A new ticket hall will also be provided at a lower level connected to the high speed platforms by escalators and subsurface links. There will be a new underground entrance from Gordon Street serving the Metropolitan and Circle lines. It will be connected to the ticket halls by a subsurface link which will also provide new connections to Euston Square underground station serving the Circle, Metropolitan and Hammersmith & City lines. The proposed pedestrian subways under Euston Square Gardens and Euston Road, and the connections to the Euston Square underground station and platforms, will be constructed using open cut excavation techniques. These works will be carried out in phases without the need for total daytime road closures, although there will be partial and overnight closures of Euston Road.

5.4.19 Works on LU at Euston during construction of the high speed station can be summarised as follows:

- Stage A (2017 to 2026)

- the existing entrance and ticket hall serving the underground within the conventional station will remain operational;
 - a new LU circulation area will be constructed with direct step-free access from the southern end of the first six high speed platforms. Escalators will provide a route for pedestrians from the ground level high speed station concourses;
 - a new ground-level entrance will be constructed to the south of the high speed station;
 - subsurface links from the high speed station and Euston underground station to Euston Square underground station and under Euston Road to a new underground entrance in Gordon Street will be constructed;
 - construction of new pedestrian routes, escalators down and lifts to the Northern line (Bank branch) and Victoria line;
 - a new ventilation shaft and escape will be constructed on Cobourg Street; and
 - when HS2 Phase One opens at the end of 2026, there will be subsurface connections from the high speed platforms to the existing LU ticket hall and Euston Square Station; and
- Stage B1 (2027 to 2033)
 - construction of the eastern part of the high speed station including passenger circulation areas at platform and LU interchange level, which will enable passengers to access the underground via the high speed station concourses;
 - completion of the remaining five high speed platforms and provision of direct access to the new LU circulation area from all high speed platforms; and
 - construction and opening of an additional access route, stairs and lifts to the Northern line (Charing Cross branch).

5.4.20 LU passengers will be rerouted on a number of occasions during the works at Euston underground station. Works to create new access to Euston Square underground station will disrupt vehicular traffic on Euston Road during construction and will also affect the Circle, Hammersmith & City and Metropolitan lines. There will be disruption to some LU services, mostly at weekends and, in some cases, overnight, to allow some works to progress.

5.4.21 Construction of the improvement works to Euston underground station is likely to require closures of the underground platforms, although both the requirement for, and the duration of, any closures will be the subject of further work with LU. There will be temporary platform closures affecting both branches of the Northern line and the Victoria line requiring through running of underground trains. The longest closure will be a simultaneous closure of Euston underground station platforms for the northbound Victoria line and northbound Bank branch of the Northern line for an approximately five months from early October 2022 to late February 2023.

Bus station and taxi facilities

5.4.22 Surface transport facilities in and around the existing station during construction of the high speed station can be summarised as follows:

- Stage A (2017 to 2026)
 - the existing bus station will operate, and an additional eight bus stands will be constructed between 2023 and the end of 2026 on the site currently occupied by Royal Mail operations off Eversholt Street to the north of the conventional station ;
 - a temporary taxi rank will be constructed in Euston Square Gardens (west) north of Euston Road and will provide a temporary taxi facility to replace the existing taxi facility located beneath the conventional station and which will be demolished in 2017⁵². In addition, further set down and pick up taxi facilities will be constructed or made available during construction Stage A comprising: a permanent taxi drop off point constructed on Eversholt Street (operational by mid 2023 but not in its permanent arrangement until the end of 2026); temporary taxi ranks on Endsleigh Gardens (in use up until the end of 2026); and a temporary taxi rank constructed on the realigned Cobourg Street (operational at the end of 2026 and will remain operational until the new northern taxi facilities are opened at the end of 2033); and
 - there will be new cycle storage areas constructed adjacent to the Cobourg Street station forecourt and the number of parking bays in Euston Square gardens (east) will be increased; and
- Stage B1 (2026-2033)
 - the linear bus station north of Euston Road will be created, with a bus access from Euston Road at Melton Street. The existing vehicular access through the middle of Euston Square Gardens will be removed. The new bus stands (constructed during Stage A) at the north of the conventional station, off Eversholt Street, will remain as a permanent operational facility;
 - a new taxi rank will be built for pick up and set down at the northern entrance to the high speed station (the Hampstead Road station entrance) and will also serve the conventional station. This facility will be integrated with green space and cycle infrastructure linking to the now enhanced cycle route running north to south along the realigned Cobourg Street;
 - the taxi drop off facility on Eversholt Street will become a permanent feature and there will be an additional drop off location for private vehicles and for passengers with restricted mobility close to the Cobourg Street station entrance; and
 - additional cycle parking will be provided on Eversholt Street (close to the northern bus standing area), in the Euston Square Gardens (west), on Gordon Street and at the southern end of Cobourg Street. In total, 2,000 cycle parking places will be provided along with 200 cycle hire docking stations.

⁵² The existing taxi rank will be in use until the alternative taxi rank is provided.

Ancillary works for OSD over the station

5.4.23 The ancillary works for OSD will comprise additional piled foundations, pile caps, rafts, shear walls and columns to support potential future OSD.

5.4.24 Piled foundations will be constructed using conventional piling techniques supported by support fluid during excavation. Typically, the piles supporting the high speed station structures will be approximately 30m deep into the Thanet Sands at – 15m OD although, in some locations, they may be extended down to – 40m OD into the Chalk. Where the density of piles is high, the piles may be joined together by rafts. However, there may be some locations where the potential height of future OSD is sufficiently high to require a change in the design of foundations. In these locations, piled rafts will be replaced by diaphragm walls running parallel to the platforms. In addition, at the southern end of the station, the column spacing will be reduced from that specified for the high speed station structures in order to support potential future OSD.

Construction sequencing – approach works

Bridges and new access roads

5.4.25 The locations for bridge works are shown on Map CT-05-001 (SES2 and AP3 ES, Volume 2, CFA1 Map Book).

5.4.26 The access ramp to the new station basement logistics and servicing area will run on/off the A400 Hampstead Road Bridge (it will connect to the bridge near to the bridge pier which sits between the high speed and conventional tracks).

5.4.27 It will be necessary to demolish the existing highway bridges that cross the station approach:

- to provide sufficient clearance for high speed trains under the existing bridge; and/or
- where the length of spans need to be increased to bridge the high speed railway.

5.4.28 The existing bridges, which are beam bridges⁵³, will be demolished. These are:

- Hampstead Road Bridge, which will be rebuilt with combined bus and cycle lanes using a continuous composite steel plate girder (or steel box girder) solution with the primary structural elements, the girders or boxes, positioned below deck level, as illustrated in LV-14-005, SES2 and AP3, Volume 2 CFA1 Map Book;
- Granby Terrace Bridge, which will be rebuilt as a narrower bridge, without parking bays, in two sections, on a slightly different alignment. Over the high speed tracks, this will comprise a composite steel plate girder (or steel box girder) structure. Over the conventional tracks, where a greater clearance is required and the span is therefore greater, the bridge structure will need to be supported by an arch; and

⁵³ A beam bridge consists of structural elements below deck level, spanning longitudinally between piers or abutments.

- Mornington Street Bridge, which will be rebuilt as a concrete beam bridge with reinstatement of the listed lamp posts and supporting piers at each end.

5.4.29 Demolition and reconstruction of the bridges will follow the general sequence below, depending on the particular structural form employed:

- construct temporary utilities bridges;
- divert utilities;
- demolish bridge including piers and foundations;
- construct new bridge piers and abutments;
- install arches or beams and cross girders;
- install utilities; and
- cast concrete deck slab, build parapet, install road finishes, lighting and signage.

Retaining walls, dive under and portal

5.4.30 A new retaining wall will be built from the north-west corner of the station northwards past Granby Terrace and through the site of the existing carriage shed. A high containment parapet, 1.8m in height, will be constructed above the retaining walls, wherever necessary.

5.4.31 An embedded retaining wall, in the form of a barrette wall with ground anchors⁵⁴, will be installed to replace the existing retaining wall and help to prevent any future movement of the Park Village East carriageway and the adjacent properties. This wall will be constructed from just south of Mornington Street Bridge northwards for 150m. These barrettes will be approximately 1.2m wide by 4.5m long and will be constructed at 4.5m centres. The existing brick parapet wall and planters will be reprovided.

5.4.32 The twin-bore tunnel will be bored from Old Oak Common (in Kilburn (Brent) to Old Oak Common, CFA4) to the Euston portal using two TBMs. On completing the tunnels, the majority of the TBM equipment will be drawn back down the tunnels for recovery at Old Oak Common. At the Euston tunnel portal, reception chambers to accommodate the TBM equipment will be constructed using piled walls. Some of the TBM equipment will need to be dismantled to allow it to be drawn back down the tunnels or removed via the portal.

5.4.33 A new dive under will be constructed north of Granby Terrace Bridge to serve the high speed tracks. The existing dive under which serves conventional rail tracks, located on either side of and beneath Mornington Street Bridge will be closed before being brought back into use with the reinstatement of Line X.

5.4.34 A headhouse will be constructed at the tunnel portal. It will be a multi-storey structure, with the main structure below street level, and will straddle the western high speed track immediately south of the tunnel entrance. The structure will contain mechanical, electrical and safety equipment to serve the tunnel. There will be a single

⁵⁴ Permanent ground anchors will be installed beneath properties on Park Village East, and the garden of 12 Park Village West, from Mornington Street Bridge northwards to a point approximately 35m south of Parkway.

storey structure at street level (approximately 8m high in relation to the adjacent street level) to provide access from street level to enable maintenance and repair of plant in the headhouse.

Above-ground structures

5.4.35 In addition to the above ground headhouse structure, other above-ground single storey structures will be required as follows:

- an intervention building to provide emergency access for firefighters adjacent to the reconstructed Granby Terrace Bridge. This building will be up to 8m high in relation to the adjacent street level; and
- a new plant building will be constructed adjacent to the rebuilt Mornington Street Bridge and will contain the tunnel ventilation and electrical equipment required for the covered sections of the high speed tracks in the station approach. This building will be up to 8m above the existing street level.

Ancillary works for OSD (station approach)

5.4.36 There are areas for potential OSD above the high speed tracks and dive under between Granby Terrace Bridge and Mornington Street Bridge where decks will be constructed.

5.4.37 The high speed dive under structures in the approach at Park Village East, north of Granby Terrace Bridge, will be sufficient to support OSD decks so additional foundations will generally not be required in this area. The vertical structure provided to support the decks will have to follow the underlying layout of the high speed dive under structure beneath.

5.4.38 The walls of the high speed dive under structures will be constructed using contiguous and raking piles, slabs and props, shear walls and barrettes. These structures will also provide support to the deck (where present). Where Line X needs to be accommodated in the same space as the high speed dive under structure, additional modifications to the high speed dive under may be required and could include a combination of a stiffened structural frame, raking piles, shear walls and ground treatment.

5.4.39 A 1.8m high containment parapet will be constructed along the edges of the deck wherever these are above or close to the operational railway.

5.4.40 The ancillary works to enable OSD will be constructed principally from in-situ cast concrete and precast concrete elements.

High speed rail infrastructure fit-out

5.4.41 The principal elements of the high speed rail infrastructure to be constructed will be track, overhead line equipment, communications equipment and power supply. The high speed track in the station approach and station will be slab track, where the rails are supported on a continuous concrete structure. Further details are set out in Volume 1, Section 6.22 of the main ES.

5.4.42 High speed trains will draw power from overhead line equipment, requiring feeder stations and connections to the 400kV National Grid network. There are no feeder

stations to be provided within the local area. In addition to feeder stations, smaller auto-transformer stations will be required at more frequent intervals. The location of the proposed auto-transformer station in this area is adjacent to the tunnel portal headhouse, at track level. This location is shown on Map CT 06-002 (SES2 and AP3 ES, Volume 2, CFA1 Map Book).

High speed railway commissioning

- 5.4.43 Commissioning is the process of testing the infrastructure to ensure that it operates as expected. This will be carried out prior to the opening of each section of the high speed railway works. Further details are provided in Volume 1, Section 6.26 of the main ES.

5.5 Operation of the revised scheme for Euston

Operational specification

- 5.5.1 Volume 1, Section 4.4 of the main ES describes the envisaged operational characteristics of Phase One of HS2 as a whole and how these may change when Phase Two is also operational.
- 5.5.2 High speed trains will either be accelerating away from or decelerating as they approach the station. Between the station and Granby Terrace Bridge, trains will travel at less than 60kph and at up to 110kph between Granby Terrace Bridge and the tunnel portal.
- 5.5.3 During Phase One, up to 14 high speed tph will arrive or depart from Euston in each direction. This will increase to a potential maximum of 18tph in each direction, when Phase Two becomes fully operational.
- 5.5.4 The high speed trains will be either 200m (one-unit train) or 400m (two-unit trains) long. Each train could hold up to 550 people (one-unit train) or 1100 people (two-unit trains). They will run between the hours of 05:00 and 24:00 (Monday to Saturday) and between 08:00 and 24:00 (Sunday).
- 5.5.5 The operation of HS2 is described further in Volume 1, Section 4.3 of the main ES.

Operational waste

- 5.5.6 Railway station and train waste refers to waste that will arise at each station. It will include waste from station operations and passenger waste removed from trains at terminating stations.
- 5.5.7 Rolling stock maintenance waste is that which will be generated by the relevant train operating company at rolling stock maintenance facilities. This has only been reported for the areas along the route in which these facilities will be located.
- 5.5.8 Track maintenance waste and ancillary infrastructure waste (for example waste from depots, signalling locations, operations and maintenance sites) has been estimated using an average waste generation rate per kilometre length of total track. For this reason, both track maintenance waste and ancillary infrastructure waste has been reported for each area along the route.

5.5.9 The quantity of operational waste that will be reused, recycled and recovered (i.e. diverted from landfill) has been based on landfill diversion performance information from NR and other sources as follows:

- railway station and trains: 60%;
- rolling stock maintenance: 80%;
- track maintenance: 85%; and
- ancillary infrastructure: 60%.

5.5.10 On this basis, approximately 737 tonnes per annum of operational waste will be reused, recycled and recovered during each year of operation of the high speed railway at Euston. Approximately 481 tonnes per annum will require disposal to landfill (see Table 8).

Table 8: Revised scheme: operational waste forecast

Waste source	Estimated quantity of waste generated per annum (tonnes)	Estimated quantity of waste for disposal to landfill per annum (tonnes)
Railway station and trains	1,193	477
Rolling stock maintenance	0	0
Track maintenance	23	3
Ancillary infrastructure	2	1
TOTAL	1,218	481

5.6 Stakeholder and community engagement

5.6.1 HS2 Ltd’s overall approach to engagement on HS2 Phase One, prior to the Bill submission is set out in Volume 1, Section 2.6 of the main ES.

Engagement before Bill submission and reported in the main ES

5.6.2 The engagement undertaken within CFA1 before submission of the main ES is summarised below. A series of community forum meetings as well as discussions with individual landowners, organisations and action groups were undertaken. Meetings of the Euston community forum were held on nine dates between March 2012 and October 2013.

5.6.3 In addition to HS2 Ltd representatives, attendees at these community forum meetings typically included local residents and residents’ groups, public representatives, representatives from LBC, action groups, affected landowners and other interested stakeholders.

5.6.4 The main issues and concerns to emerge from these meetings included:

- the design of Euston station and opportunities for OSD;
- potential environmental effects including noise and air pollution and asbestos

risks;

- the depth of the new track in the Camden cuttings and the impact of this on the Park Village East, including demolition of the western retaining wall and existing central retaining wall south of Parkway. Residents of Park Village East had particular concerns over access and egress to properties during construction;
- support for a double deck station to minimise the amount of land required;
- a need for wider engagement and accessibility for the community in Camden;
- the loss of three social housing blocks on the Regent's Park Estate and the effects of the displacement of the residents of these housing blocks on the wider community, as well as the need for replacement social housing;
- safeguarding the boundary around Euston station;
- employment for local people throughout construction;
- the effects on the Maria Fidelis Convent (Lower) School during construction if the school remains on its present site in North Gower Street;
- the community's preference for the National Temperance Hospital buildings to be used after construction as social housing;
- the construction and operational effects for Drummond Street businesses;
- 'blight' on the area for more than ten years and loss of a tight knit community because of the effects of HS2 on housing, businesses and schools;
- concerns that HS2 Ltd will take unnecessary powers to acquire land and the loss of LBC's planning powers;
- loss and replacement of public space at St James's Gardens;
- request for guarantees for all tenants, leaseholders and property owners that they will receive compensation and that residents will not have to move more than once;
- a preference for Old Oak Common as the London terminus for HS2;
- concerns about the extent of evening and night-time construction works;
- local residents' reluctance to have a taxi rank in Cobourg Street;
- impacts on Hampstead Road due to increased construction traffic and the wider impacts on bus routes and services;
- concerns about air quality and pollution; and
- concerns about construction traffic within the Regent's Park Estate.

5.6.5 In addition to this engagement, the draft ES and design refinement consultations took place between May and July 2013 for a period of eight weeks. As part of these consultations, members of local communities and other interested parties were

notified, provided with information and invited to engage on issues pertinent to the draft ES and the development of the original scheme. Details of the local consultation events were provided on HS2 Ltd website, social media, posters at local venues, national and regional advertising and to properties within 1km of the original scheme. In the Euston area, consultation on the draft ES and on the design refinement (which included Euston station) was held on 24 May 2013 at the Bengali Workers Association in Robert Street. There was also a Camden Town event on 22 June 2013, at Castlehaven Community Centre, which covered the Euston area.

- 5.6.6 Responses from the draft ES consultation were analysed and an overview of those received and how the main ES took account of responses is contained in the Draft ES Consultation Summary Report (Volume 5 of the main ES: Appendix CT-008-000).

Engagement since submission of the Bill

- 5.6.7 Since 2012, HS2 Ltd had been working closely with LBC, the GLA, TfL, NR and property interests to help progress the draft EAP. Following submission of the Bill, stakeholders had expressed concerns in early 2014 that the original scheme at Euston was insufficiently aligned with the wider regeneration and development vision for the Euston area in the EAP as submitted. HS2 Ltd continued to work with LBC and others and was a participant in the public examination of the EAP in July 2014. The EAP was adopted by LBC and the GLA in January 2015 as part of the statutory local planning framework for the regeneration and development of the Euston area.
- 5.6.8 The Higgins Report, HS2 Plus, in March 2014, and the Secretary of State's response to this report recognised stakeholder concerns. HS2 Ltd was instructed to examine the feasibility of a more comprehensive development of Euston station, including appropriate stakeholder, landowner and local community engagement.
- 5.6.9 A joint team from HS2 Ltd, NR and the DfT, responsible for this work, has continued to engage with these key stakeholders during preparation of the revised scheme.
- 5.6.10 Since deposit of the Bill, HS2 Ltd has also continued to work with LBC to secure arrangements for the mitigation of permanent and construction impacts. In particular, an agreement has been made with LBC for the provision of replacement housing for tenants, who will be displaced from housing on the Regent's Park Estate and in Cobourg Street that is required for HS2. There have also been regular meetings with LBC representatives to discuss mitigation for issues ranging from transport, businesses, schools and the 'habitability' of housing close to the scheme. Meetings with LBC have taken place on a bilateral basis. Meetings have also taken place with individuals and groups of residents and businesses to seek to resolve concerns arising from the original scheme and the Bill powers as it affects them.
- 5.6.11 A Euston station working group, comprising representatives from the local community (including local interest groups, businesses and action groups), LBC, NR, TfL, GLA and HS2 Ltd met on five occasions between March and September 2014, to review options being considered for a revised scheme. In late 2014, a further working group examined the potential for a wider 'Euston Group' as a focus for ongoing community engagement.

5.6.12 To take this forward, a new phase of community engagement in the form of community round table meetings was set up. Three meetings were held to discuss with the community how to engage about the proposed works:

- 21 January 2015. This meeting outlined the work that had taken place following the HS2 Plus report and the programme for 2015 and beyond. Main issues raised by the community were removal of excavated material by rail; alignment with the EAP; compensation and the scope of community input and influence;
- 23rd February 2015. This meeting included an update on the design concept, an outline of the phased approach to construction of both phases of the high speed station. A key concern of the community was that they had not been involved in the design; and
- 23rd March 2015. This meeting included proposals for information sessions on topics such as the CoCP, noise and vibration and the formation of smaller, local sub-groups.

5.6.13 Following these meetings, a series of smaller, geographically focused sub-groups was set up. Anyone could attend these sub-group meetings to discuss concerns related to that area. Representatives from the sub-groups could then raise those concerns at the Euston Community Representatives Group. The aim is to engage with the local area and capture the views of people who may not be heard at larger public meetings. On 18 May 2015, the first Euston Community Representatives Group meeting took place, with further meetings on 15 June and 20 July 2015. Five local sub-group meetings took place during June and July 2015.

5.6.14 Community and stakeholder engagement will be continued following the submission of AP3.

5.7 Route section main alternatives

5.7.1 The main strategic alternatives considered prior to submission of the Bill and the local alternatives considered up to January 2012 are presented in Volume 1, Section 10 of the main ES.

5.7.2 The main local alternatives considered in CFA1 since January 2012 are summarised in this section. This summary is divided into two subsections, the first covering the alternatives considered before Bill submission and the second reporting the alternatives considered (or reconsidered) since Bill submission.

Local alternatives considered for the original scheme before Bill submission and reported in the main ES

5.7.3 During 2012 and early 2013, as part of the design development process, a series of local alternatives for Euston station and the station approach were reviewed in workshops attended by engineering, planning and environmental specialists. During these workshops, the likely significant environmental effects of each design option were identified, as far as possible. The purpose of those reviews was to ensure that the original scheme achieved the appropriate balance between engineering requirements, cost and the likely environmental effects.

Euston station options considered before Bill submission

5.7.4 In the January 2012 announced scheme and in the subsequent appraisal against other options, it was assumed that high speed services at Euston would require 10 dedicated high speed platforms, two hybrid platforms shared with classic trains and 12 classic platforms. Platform numbers were calculated using proposed service patterns for both high speed and classic services. Further review of operational requirements removed the need to provide two hybrid platforms, but increased the number of high speed platforms to 11 in the original scheme.

5.7.5 A systematic examination of potential configurations for Euston station was undertaken. Six station configuration options, which are described below, were subject to appraisal. Following further stakeholder engagement, additional work was undertaken to appraise a variant of one of these configuration options (double deck) and this variant (double deck down) is also reported below. All of these station configurations were 'freestanding stations' without substantial OSD.

Add to existing platforms (which became the original scheme)

5.7.6 This option was selected as the preferred option and following further refinement of the station design was incorporated into the original scheme.

5.7.7 In this option, the majority of the existing station track and platform layout would be retained. The three, westernmost platforms of the existing station were to be removed and 11 high speed platforms built to the west below existing ground level. At the time of the options appraisal, it was assumed there would be 10 high speed and two hybrid platforms. Two of the existing office buildings in front of the station would be retained and a high speed concourse would be built at street level. As part of the design, the existing station was to be remodelled and an integrated station concourse provided for both high speed and classic services. The Euston underground station concourse was to be enlarged at its existing level.

5.7.8 To accommodate the extension of the station, the station approach would need to be widened, which would require land outside the current operational railway boundary.

5.7.9 The works require demolition of residential and commercial property to the west of the existing station, including three residential blocks on the Regent's Park Estate.

5.7.10 Most of the public open space at St James's Gardens would be within the land required permanently.

5.7.11 Euston Square Gardens would be reinstated following construction. The bus station north of Euston Square Gardens was to be modified. A new pedestrian subway from the station under Euston Road would link to Euston Square underground station and an entrance in Gordon Street.

5.7.12 This option would allow the construction of the east west overbridge, providing a route over the tracks to the north of the station.

5.7.13 Excavation would only be necessary for the high speed part of the station, unlike the January 2012 announced scheme. The volume of material excavated in this 'add to existing platforms' option was estimated to be less than half that of the January 2012 announced scheme.

5.7.14 This option was selected to become the original scheme because it satisfied the transport requirements, as defined at that time, for capacity, interchange and passenger dispersal while meeting the target for commencement of high speed services in 2026. The overall costs and construction programme for this option was identified as significantly less than for the January 2012 announced scheme, because elements of the existing operational infrastructure, e.g. most platforms, could be retained. The reduced extent and duration of construction, when compared with the January 2012 announced scheme, also reduced some of the construction related environmental effects.

January 2012 announced scheme

5.7.15 The January 2012 announced scheme was based on the station concept design put forward during consultation in 2011, which proposed rebuilding of the entire existing station as a single high speed and classic station. This included a combined concourse at existing ground level. Both high speed and classic platforms would be built below the concourse with 10 high speed platforms, 12 classic platforms and two central hybrid platforms. The Euston underground station concourse would be rebuilt at a lower level beneath the platforms.

5.7.16 As with the 'add to existing platforms' option, this option would require demolition of residential and commercial property to the west of the existing station including three residential blocks on the Regent's Park Estate and widening of the station approach tracks.

5.7.17 An east-west overbridge would be provided to the north of the station.

5.7.18 Most of the public open space at St James's Gardens would be within the land required permanently. Euston Square Gardens would be retained and would not be affected by any permanent land requirement for the new station or the bus station, which would move north from its existing position.

5.7.19 The appraisal assumed that the Grade II* listed 1923 annex of 1-9 Melton Street would need to be demolished, but subsequent refinement of the option design might have avoided this.

5.7.20 This option would be complicated to construct while maintaining the existing level of classic rail services and construction could not be completed by 2026, the target opening year. A construction period extending beyond 2026 would extend the duration of travel disruption for users of the existing station as well as the associated adverse environmental effects.

5.7.21 The January 2012 announced scheme was rejected principally because, on further evaluation, it was found not to meet cost and completion date targets, as well as causing prolonged disruption to the local communities.

Double-deck station

5.7.22 High speed platforms would be constructed on two levels. There would be a concourse at street level with platforms above and below the concourse level. Ten high speed platforms and six or eight classic platforms would be constructed below street level (lower level platforms). Another six or eight classic platforms would be

constructed at high level (upper level platforms) above a combined concourse. The Euston underground station concourse would be rebuilt at a lower level.

- 5.7.23 Due to the stacking of platforms, the footprint of the double-deck station would be less than the other options considered apart from the 'double-deck down' option. Less land would be required for the track fans on the railway approach north of the station. It was estimated that considerably fewer dwellings would be affected by this option, compared to the original scheme. No residential blocks would need to be demolished on the Regent's Park Estate. Commercial and other residential property west of the existing station footprint would not be demolished and St James's Gardens would not be directly affected.
- 5.7.24 All of Euston Square Gardens would be required for this option, which would adversely affect the listed war memorial and lodges and the Bloomsbury Conservation Area.
- 5.7.25 The elevated level of the upper platforms would require a railway viaduct that would need to pass over Hampstead Road Bridge, which would create a visually intrusive structure and introduce the potential for train noise to affect more properties than other options. This option would not allow the construction of an east-west bridge to the north of the station.
- 5.7.26 The principal reasons for rejecting the double-deck station option were that it would be unable to maintain a sufficient level of classic train services during construction and require an extended construction programme. The complexity of the double-deck station and the approach would extend the construction period by at least four years, and delay the commencement of high speed services. A construction period extending beyond 2026 would also significantly extend the duration of travel disruption for users of the existing station as well as the associated adverse environmental effects.

Double-deck down station

- 5.7.27 Following further stakeholder engagement, a variant of the double-deck configuration, the 'double deck down' was also considered. This option would have a concourse at street level and two levels of platforms below the concourse.
- 5.7.28 The only feasible location at Euston for a low-level double-deck configuration would be to the east of the Northern line (Charing Cross branch) platform tunnels. The double-deck down option would require the demolition of 140 dwellings, which is fewer than the original scheme, but greater than the double-deck station, described above. In addition, the deep excavation required could impose unacceptable movements or stresses on the Northern line tunnels and the foundations of Gillfoot, a residential tower block.
- 5.7.29 There would be a requirement to construct the same number of platforms as the original scheme in and below the existing station footprint and approaches, while keeping the existing train services operational. The depth of the underground line tunnels, at this location, limits the depth of the new platforms and the underground station itself would need to be largely rebuilt. Such a rebuild of the whole station complex above and below ground, while maintaining services, would inevitably involve a complicated staging process.

- 5.7.30 The double-deck down option was rejected because it would still require substantial numbers of residential properties and construction would be long, complicated and costly. In particular, construction would take approximately 19 years, there would be major operational disruption to classic services and costs would be about twice those for the original scheme.

Split-level platforms

- 5.7.31 The number of platforms would be the same as the January 2012 announced scheme. However, only the high speed and hybrid platforms would be constructed below ground level. The classic platforms would be repositioned as needed but still at their existing level. Separate concourses for high speed and classic services would be built at existing ground level. There would be a substantial separation between the high speed and classic parts of the station.
- 5.7.32 As with the original scheme, this option would result in demolition of residential and commercial property to the west of the existing station and of three residential blocks on the Regent's Park Estate and widening of the station approach tracks.
- 5.7.33 Most of the public open space at St James's Gardens would be within the land required permanently.
- 5.7.34 The whole of Euston Square Gardens would be required for the classic station concourse and access, which would affect the war memorial and lodges in Euston Square, the setting of listed buildings and the Bloomsbury Conservation Area.
- 5.7.35 The appraisal assumed that the Grade II* listed 1923 annex to 1-9 Melton Street would need to be demolished.
- 5.7.36 The 'split-level platforms' option was rejected, in particular, because of poor internal operation of the station and its environmental effects on Euston Square and the gardens.

Platforms at existing ground level

- 5.7.37 Platforms would be arranged as in the January 2012 announced scheme, but would be constructed at existing ground level. This would require a higher-level concourse that would be combined to serve both high speed and classic rail passengers. Constructing high speed platforms at the existing ground level would require Hampstead Road and Granby Terrace Bridges to be raised substantially to allow trains sufficient clearance to pass beneath.
- 5.7.38 Similar to the original scheme, this option would require the demolition of residential and commercial property to the west of the existing station and three residential blocks on the Regent's Park Estate. Additionally, the assessment identified that an extra residential block, Cartmel, would need to be removed to allow the substantial raising and associated extension of the Hampstead Road Bridge.
- 5.7.39 Most of the public open space at St James's Gardens would be within the land required permanently. The bus station would extend across most of the north-east part of Euston Square Gardens, but would not affect the war memorial or lodges.

- 5.7.40 This option would avoid significant excavation because the tracks would be at existing ground level, which would yield a cost saving over the January 2012 announced scheme and simplify construction.
- 5.7.41 The appraisal assumed that the Grade II* listed 1923 annex to 1-9 Melton Street would need to be demolished.
- 5.7.42 This option was rejected because it would require the demolition of more dwellings than any other option as well as requiring bridges to the north of the station to be raised creating permanent visual effects.

Slide platforms southwards

- 5.7.43 The same platform arrangement as the January 2012 announced scheme would be built but the whole station would be moved southwards, extending into Euston Square Gardens. Platforms would be below existing ground level allowing a combined high speed and conventional station concourse to be built at existing ground level.
- 5.7.44 As with the original scheme, this option would result in demolition of residential and commercial property to the west of the existing station and three residential blocks on the Regent's Park Estate and widening of the station approach tracks.
- 5.7.45 Most of the public open space at St James's Gardens would be within the land required permanently. Moving the station southwards would simplify railway design in the station approach, but the station footprint would take all of Euston Square Gardens.
- 5.7.46 The volume of excavated material created by this option was estimated to be greater than the January 2012 announced scheme.
- 5.7.47 This option would require demolition of the Grade II* listed 1-9 Melton Street, including the 1923 annex.
- 5.7.48 This option was rejected because there would be no transport or operational benefits over the original scheme and it would create substantially greater adverse environmental effects.

Station approach options considered before Bill submission

- 5.7.49 Design and environmental appraisals were undertaken on key elements of the works in the station approach, in particular the construction requirements at Parkway and Park Village East and the layout and design of the replacement Hampstead Road and Granby Terrace Bridges. These appraisals resulted, in particular, in reductions in the likely adverse environmental effects during construction and in the permanent land requirements, visual and cultural heritage effects at these locations.

The potential for OSD considered before Bill submission

- 5.7.50 The powers in the Bill would allow the construction of a station including ancillary works for OSD. The main ES, in the CFA1 Volume 2 Chapter 14, included an environmental assessment of this as a variant of the original scheme. The extent of the OSD decks assessed reflected HS2 Ltd's appraisal in 2013 of the maximum extent of OSD supports and deck that could feasibly be built over the HS2 station and tracks

to Hampstead Road Bridge; over the HS2 tracks between Granby Terrace Bridge and Mornington Street Bridge and over the concourse of the conventional station.

Local alternatives considered (or reconsidered) since Bill submission

- 5.7.51 The main local alternatives to the revised scheme considered for Euston station and the station approach in CFA1 since November 2013 are set out in this section.
- 5.7.52 Alternatives were considered in two phases of work, the first, between March and September 2014 and the second, since October 2014. The first phase was focused on meeting stakeholder concerns, in particular about the retention of much of the existing station and the lack of alignment between the original scheme and the wider development and urban regeneration proposed in the submitted EAP. This work took account of the decision of the Secretary of State, in March 2014, not to pursue the implementation of the proposed HS1-HS2 Link.

Local alternatives considered between March and September 2014

- 5.7.53 The local alternatives were the subject of systematic review, taking account of engineering and operational requirements for HS2 and the conventional railway, transport interchange requirements, the development and regeneration opportunities and environmental impacts, as well as cost and programme considerations. The objective of these reviews was to bring forward a revised scheme that was robust and deliverable and could achieve the desired balance between the transport requirements, cost and the likely environmental effects, while facilitating, as far as possible, the delivery of the submitted EAP vision. This included a complete development of a high speed station and redevelopment of the conventional station.
- 5.7.54 These reviews were undertaken jointly by HS2 Ltd and NR. A key aspect of the design development in this first phase was the testing and refinement of a construction strategy and programme for the station, approach and ancillary works, which could maintain the operation of Euston as a mainline terminus and transport interchange throughout the construction period. In order to achieve acceptable operation of the existing station throughout the construction period, it would have been necessary to remove certain suburban and longer distance services from Euston and redirect them to other central London stations. This would have been needed to allow for a complete redevelopment of the eastern part of the existing Euston station, integrated with the high speed station.
- 5.7.55 In the first phase, two principal station configuration options were considered and compared with the original scheme (described as option A):
- a 'split-level deck' station. This would provide the potential for significantly more OSD over the high speed and conventional station and high speed approach than the original scheme, with incremental phasing (option B); and
 - a 'full-level deck' station. This would provide the potential for maximum OSD over the high speed and conventional station and both approaches, with incremental phasing (option C).
- 5.7.56 The environmental appraisal of these options did not consider the environmental impacts of any OSD, just the ancillary works needed for the decks.

Split-level station (Option B)

- 5.7.57 The principal differences between option B and option A would have been the creation of a 'split-level deck' across the whole of the high speed and conventional station starting at about the level of Cobourg Street and extending as far north as Hampstead Road Bridge. The conventional tracks would have been rebuilt at their existing level. The east-west link road and additional east-west pedestrian routes could be provided across the decks, but with a significant level difference at Eversholt Street. There would have been no substantial difference in land required from that for the original scheme, although the office buildings at 1 Eversholt Street and the Podium would need to be demolished. This option would provide the opportunity for more OSD than the original scheme, in particular, above the conventional station, although the level differences at Eversholt Street would have constrained the potential to deliver east west permeability. The construction programme would need to be staged, with overall completion of the conventional station and OSD deck in 2035. Various arrangements for the incremental rebuilding of the conventional station were tested.
- 5.7.58 Option B would have provided a better integrated station than the original scheme and could be delivered with acceptable disruption to train operations during construction. It would have met some of the development and regeneration objectives of the EAP, although it could only provide for housing and employment development to meet the 'lower-bound' development estimates in the EAP.
- 5.7.59 The permanent environmental impacts of option B were assessed as little different from option A, apart from some potential improvement of the urban streetscape in Eversholt Street. The assessment of option B assumed that the total amount of excavated material and demolition material to be removed would be around 20% greater than for option A, but this would take place in several stages. The longer construction period would extend construction traffic, noise and air quality impacts over a longer period, although peak construction traffic flows would be similar to those in option A. Broadly, the same residential communities would be affected, although there would be greater impacts than the original scheme on residents and businesses in Eversholt Street.

Level deck station (Option C)

- 5.7.60 Option C would have been a fully 'level deck' station, with the conventional tracks rebuilt at HS2 track level and with the conventional platforms extending forward towards Euston Road, beneath the existing concourse area. This would enable better station integration than option B and the potential to resolve the level differences along the Eversholt Street frontage. This would have provided for a more complete network of 'streets' across the station, meeting the access and permeability aspirations of the EAP. An additional LU entrance could have been provided on Eversholt Street. It would provide greater capacity than option B for OSD above the station and included additional decks over the high speed and conventional tracks between Hampstead Road Bridge and Parkway. The land required would be the same as option B, with the addition of strips of land along the eastern side of the conventional railway, to allow reconstruction of the existing retaining walls, in places to greater depth. The construction programme would have been similar to option B, completing in 2035.

- 5.7.61 Option C would deliver a more fully integrated station than option B, with a single level concourse extending across all platforms. It could be delivered with acceptable disruption to operations during construction. It would facilitate achieving the key development and regeneration objectives of the EAP. It would allow for housing and employment development to meet the 'upper bound' development estimates in the EAP.
- 5.7.62 The permanent environmental impacts of option C would be little different from the original scheme (option A), apart from the substantial potential improvement of the urban streetscape in Eversholt Street; the potential visual and landscape impacts of decks along Park Village East and Mornington Terrace and the temporary loss of a community hall on the Ampthill Estate. It could fully deliver the key development and regeneration objectives of the EAP, in the form of OSD, albeit over a longer timescale.
- 5.7.63 Option C would increase the amount of excavated material and demolition material to be removed by around 30% over the original scheme. The longer construction period would extend construction traffic, noise and air quality impacts over longer periods, although peak construction traffic flows would be similar to option A. Broadly, the same residential communities would be affected, although there would be greater or more prolonged impacts than option A on residents and businesses in Eversholt Street and on residents in Mornington Terrace, Mornington Crescent and the Ampthill Estate.
- 5.7.64 Following the selection of option C as the preferred option, both the design and construction programme were refined to create a potential revised scheme that was ready to be brought forward as an AP. These refinements included improving the layout and positioning of the station concourse; replacing deck level station servicing with a service basement; reducing the extent of the proposed OSD decks over the conventional railway between the station and Mornington Street Bridge; adjustments to the design of conventional station platforms 1 and 2, including reduced train clearances, to further improve frontage development and pedestrian access from Eversholt Street.
- 5.7.65 In September 2014, plans to submit an AP for the 'level deck' revised scheme were suspended. It was decided that more work should take place to find a solution which balanced the objectives for high speed and conventional railway operation; social and economic improvements for the local community; minimising impacts during construction and meeting funding constraints.

Local alternatives considered since October 2014

- 5.7.66 Following the decision not to proceed with the full 'level deck' station, HS2 Ltd and NR (reporting to a Euston joint sponsor board chaired by DfT) revisited the objectives for Euston station and grouped these into a set of four 'high-level requirements'. In summary, these were:
- cost: to deliver the high speed station and related works within the HS2 Phase One budget;
 - programme: to achieve opening of HS2 Phase One in 2026 and HS2 Phase two by 2033;
 - function: to deliver an effective high speed and conventional station; and

- wider vision: to help facilitate the wider development vision for the Euston area.

5.7.67 The high-level requirements were used to rework the assessment of options for the high speed station, while securing the potential for future redevelopment of the conventional station.

5.7.68 The approach to considering options for Euston station was undertaken in three sequential steps:

5.7.69 Step 1: understanding the aims and requirements for redeveloping Euston station ('strategy options') which considered two main alternatives:

- a staged (or incremental) approach to developing the high speed station: constructing the high speed platforms in stages to deliver the minimum required to operate the proposed Hs2 service specification for HS2 Phase One by 2026 and then for HS2 Phase Two by 2033. This would minimise disruption to conventional rail services during construction; and
- a non-staged approach – Providing the full HS2 Phase Two capability at Euston by 2026, which is likely to disrupt conventional services as fewer conventional rail platforms can be kept in operation during construction.

5.7.70 The key requirement, confirmed by review of the latest passenger demand forecasts, was that no fewer than 16 platforms would be needed for conventional services to operate, without substantial disruption, in the period to 2026, in the absence of other mitigation.

- Step 2: reconsidering station arrangements, drawn from the option families developed and tested before Bill submission, and their alignment with a staged delivery of the Euston scheme ('station arrangement options'). These, which have already been described, were:

- subsurface platforms;
- split level platforms;
- double deck platforms; and
- ground-level platforms; and

- Step 3: establishing the components required in each stage of delivery to enable a satisfactory outcome through initial stages, with the flexibility to ultimately deliver the desired end state ('configuration development options') which included:

- two basement options;
- two designs for improved LU facilities; and
- two options for the number of high speed platforms to be provided in the first stage of construction.

5.7.71 This analysis was itself sequential, considering the basement provision before considering the LU and high speed platform options.

- 5.7.72 The non-staged approach was rejected in Step 1, because it cannot meet the functional requirement to maintain no fewer than 16 conventional platforms through to 2026. The staged approach could meet all four high-level requirements.
- 5.7.73 In Step 2, the four station families were reassessed, taking into account the differing levels of scheme development achieved for two of the families. The double-deck family failed to meet the cost, programme or function requirements. The ground-level family was rejected principally because it would only support restricted OSD and hence does not meet the wider vision requirement. The subsurface and split-level options can both meet all four high level requirements, although subsurface options are better able to deliver the wider vision requirement in terms of creating east-west and north-south streets across the station and high-quality OSD. Both configurations were taken forward into Step 3.
- 5.7.74 In the first part of Step 3, two basement options were considered: a minimum basement (as in the original scheme) and a much larger service and logistics basement, which would provide optimal underground servicing to the high speed station. The minimum basement option would require the continued use of the parcels deck of the conventional station to provide servicing for the high speed station. It was concluded that only the larger basement could meet the wider vision requirements, without compromising future flexibility for the redevelopment of the conventional station or the extent or value of OSD that can be achieved.
- 5.7.75 In the second part of Step 3, two LU options, P1 and P2, were considered. Both would extend the Victoria/Northern Line ticket hall with a new entrance from Euston Square. Option P1 would require HS2 passengers to walk up from platform level to ground level before descending into the LU station. Option P2 provides direct subsurface pedestrian links between high speed platforms and the LU ticket hall. Option P2 provides sufficient long term capacity and desirable level subsurface routes between the high speed station and LU. It would also provide for more dispersed pedestrian access to LU in support of the wider vision. Option P1 might be adequate for HS2 Phase One operations but would need to be upgraded to Option P2 before HS2 Phase Two opens.
- 5.7.76 Under option P1, the demolition of One Euston Square and Grant Thornton House could be deferred until 2026, but this would extend disruptive above-ground works at the front of the station into the post 2026 period. It was concluded that option P2 should be pursued.
- 5.7.77 In the third part of Step 3, two high speed station platform options were considered: (i) to provide seven platforms by 2026 or (ii) to provide six platforms by 2026. The first option would require removal of more of the western part of the existing station, with consequentially a higher risk of disruption to conventional station operation and services. It was concluded that the second option should be taken forward. There are no significant differences in environmental impact.
- 5.7.78 The revised scheme, as the design has developed, is a subsurface high speed station, to be delivered in two stages, minimising interference with the existing conventional station before 2026. This will facilitate delivery of the HS2 and NR operational requirements, provide ancillary works to enable OSD and leave NR with the maximum flexibility to promote future redevelopment of the conventional station.

5.7.79 Further engineering and viability analysis has confirmed the extent of OSD ancillary works over the high speed tracks north of the station, which have been included in the revised scheme.

5.7.80 In relation to the reinstatement of Line X, a number of alternatives were considered, including the potential use of the third tunnel from Old Oak Common, previously intended to serve the HS1-HS2 Link, but these were rejected on cost, technical and environmental grounds.

6 Agriculture, forestry and soils

6.1.1 This environmental topic has been scoped out of the assessment for CFA1 as there are no agricultural or forestry activities affected by the revised scheme in this urban area.

7 Air quality

7.1 Introduction

7.1.1 This section of the report provides an assessment of the impacts and likely significant effects on air quality arising from the construction and operation of the revised scheme, covering NO₂, particulate matter⁵⁵ (PM₁₀) and dust.

7.1.2 The main potential effects on air quality are anticipated to result from the emissions of the above pollutants from road traffic and the operation of combustion plant. The road traffic emissions will arise mainly from temporary and permanent road closures and diversions during the construction phase, as well as during operation when the surrounding road network will be permanently altered. In addition, dust emissions will arise from construction activities, which include demolition, site preparation works, construction of the station and tunnel portal and the movement of machinery and vehicles within the sites. Emissions from combustion plant will arise from the operation of the station.

7.1.3 Detailed reports on the air quality data and assessments for this area, as well as relevant maps, are contained within Volume 5. These include:

- SES2 and AP3 ES Appendix AQ-001-001;
- Map AQ-01-001 (SES2 and AP3 Volume 5 AQ Map Book); and
- Map AQ-02-001-01, Map AQ-02-001-02 and Map AQ-02-001-03 (SES2 and AP3 Volume 5 AQ Map Book).

7.1.4 Maps showing the location of the key environmental features can be found in Volume 2 SES2 and AP3 CFA1 map books.

7.2 Scope, assumptions and limitations

7.2.1 The assessment scope, key assumptions and limitations for the air quality assessment are set out in Volume 1 and the SMR Addendum 3 (SES2 and AP3 ES Volume 5: Appendix CT-001 -000/4).

⁵⁵ PM₁₀ describes airborne particles of size less than 10 micrometres in diameter that can be inhaled and therefore are of concern for human health.

- 7.2.2 The study area for the air quality assessment has been determined on the basis of where impacts on air quality may occur:
- from construction activities;
 - from changes in the nature of traffic during construction and operation, for example, where road closures or restrictions cause diversions and heavier traffic on adjacent roads;
 - where road alignments have changed; and
 - from the operation of combustion plant.
- 7.2.3 The assessment of impacts arising from construction dust emissions has been undertaken using the methodology produced by the IAQM⁵⁶.
- 7.2.4 The assessment of construction impacts has incorporated HS2 Ltd's policy on the type of Heavy Goods Vehicles (HGVs) to be used, which states: in order to help mitigate impacts on local air quality, in areas where there is action in place to meet EU limit values through the introduction of Low Emission Zones (such as the London Low Emission Zone), the Nominated Undertaker will require HGVs⁵⁷ entering these designated Zones during construction, for the purposes of transporting excavated material, to be powered by Euro VI (or lower emission) engines. Euro VI engines are required to have substantially lower emissions of NO_x and particulate matter than older engines.
- 7.2.5 As set out in Volume 1 of the SES2 and AP3, EPUK and the IAQM have issued new guidance⁵⁸ on the consideration of air quality within the land use planning and development control process. This guidance makes changes from the previous 2010 EPUK guidance in the process of determining the impact descriptors at each receptor.
- 7.2.6 Use of the approach to assess significance from the revised IAQM/EPUK guidance in the air quality assessments for SES2 and AP3 rather than the previous HS2 air quality methodology is likely to result in a larger number of receptors being reported as experiencing a significant effect. This is because with the same predicted change in pollutant concentration at a receptor, the new guidance is more likely to result in an impact being described as 'moderate' or 'substantial' compared with the use of the previous version of the guidance. For example, where the baseline NO₂ concentration is 38µg/m³ and the concentration at a receptor would increase with the scheme by 1.5µg/m³ to 39.5µg/m³, the 2010 guidance would describe the impact as 'slight adverse' whilst, for the same situation, the use of the 2015 guidance would describe the impact as 'moderate adverse'. Given that the HS2 air quality methodology defines moderate (or substantial) impacts as having a significant effect, using the new guidance for the example illustrated above would result in a significant effect.
- 7.2.7 This outcome is more likely for receptors where the baseline NO₂ concentration is in excess of the air quality standard value, which is 40µg/m³.

⁵⁶ IAQM (2014), Guidance on the assessment of dust from demolition and construction.

⁵⁷ Heavy goods vehicles are defined as those with an unladen weight greater than 3.5 tonnes.

⁵⁸ Moorcroft and Barrowcliffe et al., (2015), Land-Use Planning & Development Control: Planning for Air Quality. London: Institute of Air Quality Management.

- 7.2.8 A comparison of the difference in impact descriptors arising from following the new guidance is shown in the tables of results for construction stage impacts in the SES2 and AP3 ES Volume 5 Appendix AQ-001-00, for annual NO₂, annual mean PM₁₀ and 24-hour PM₁₀.
- 7.2.9 The assessment of traffic emissions has used traffic data based on an estimate of the average daily flows of construction vehicle movements in peak months during construction Stage A period (2017-2026) and the Stage B1 combined construction and operation period. For Stage B1, the peak construction traffic has been combined with the operational traffic associated with HS2 Phase One operation to create a single combined traffic scenario.
- 7.2.10 There are three construction traffic scenarios that have been assessed during the Stage A period. Their assessment assumes 2017 vehicle emission rates and 2017 background pollutant concentrations. One construction traffic scenario has been assessed during the Stage B1 combined construction and operational period. This assessment assumes 2026 vehicle emission rates and 2026 background pollutant concentrations. The reason for this is that both pollutant emissions from exhausts and background pollutant concentrations are expected to reduce year by year as a result of vehicle emission controls and so the earliest year in each stage represents a conservative approach to the assessment. Furthermore, it has been assumed that the changes in construction traffic will occur for the whole year. In many cases, this is a conservative approach, as the duration of the peak traffic flows may well be much shorter. These scenarios have been assessed against the relevant future baseline cases without the revised scheme.
- 7.2.11 The peak traffic scenarios used in the air quality assessment align with those used in the traffic and transport modelling (see Section 15, Traffic and transport). The air quality modelling has not included scenarios for the operation of HS2 in isolation of construction in 2026, but captures the combination of construction and operation to provide a conservative assessment for the period post 2026.

7.3 Environmental baseline

Existing baseline

- 7.3.1 The environmental baseline reported in this section represents the air quality conditions identified within the study area. The main source of existing air pollution in the area is emissions from road traffic, as is the case for nearly all parts of London. At places very close to roads where traffic flows are high, the concentrations of the main pollutants are elevated substantially when compared to the 'urban background', as exemplified by locations near Euston Road.
- 7.3.2 Information on the current air quality conditions in the study area has been obtained from the following sources:
- London-wide modelled pollution maps⁵⁹ for 2011, published by the GLA;
 - monitoring data from Department for Environment, Food and & Rural Affairs

⁵⁹ Greater London Authority (GLA) (2010) *London Atmospheric Emissions Inventory 2008 Concentration Maps*; <http://data.london.gov.uk/laei-2008-concentration-maps>; Accessed: May 2015.

(Defra) and local authority sites; and

- background concentration maps⁶⁰ produced nationally by Defra.

- 7.3.3 The Euston area lies in the south-east of the LBC, although the City of Westminster (WCC) is also close to the boundary of the study area. Therefore, information has also been taken from relevant sources within WCC.
- 7.3.4 Monitoring in the vicinity indicates that many parts of the Euston area currently experience long-term and short-term average concentrations⁶¹ of NO₂ that exceed air quality standards, especially in close proximity to major roads. Monitoring and mapping data indicate that air quality standards for daily mean PM₁₀ have also been exceeded in recent years. Annual average PM₁₀ concentrations currently meet the standards. Background map and monitoring data are presented in SES2 and AP3 ES Volume 5 Appendix AQ-001-00.
- 7.3.5 Whole borough Air Quality Management Areas (AQMAs) have been designated by LBC and the WCC, as a result of NO₂ and PM₁₀ concentrations being in excess of the air quality standards for the annual and daily average respectively.
- 7.3.6 There are many receptors in the study area given its urban nature and the proximity of many residential properties and commercial premises to construction sites and roads where traffic flows will change (see Map AQ-01-001, Map AQ-02-001-01, Map AQ-02-001-02 and Map AQ-02-001-03, SES2 and AP3 Volume 5 Air Quality Map Book). There are no receptors with statutory ecological designations within this study area.

Future baseline

- 7.3.7 The potential for cumulative impact from committed developments on air quality, acting in conjunction with the effects from the construction and operation of the revised scheme, has been considered as part of this assessment. This has been achieved by including changes in traffic resulting from likely future developments within the traffic data used for the air quality assessments for construction and operation.

Stage A construction (2017-2026)

- 7.3.8 Future background pollutant concentrations have been taken from Defra background maps⁶⁰ for 2017. Defra background maps predict NO₂ and PM₁₀ concentrations in 2017 to be lower than in the 2012 baseline.

Stage B1 construction and operation (2026-2033)

- 7.3.9 Future background pollutant concentrations have been taken from Defra background maps⁶⁰ for 2026. Defra background maps predict NO₂ and PM₁₀ concentrations in 2026 to be lower than in the 2012 baseline.

⁶⁰ Department for Environment, Food and Rural Affairs (Defra) (2012) *Defra background maps 2011*; http://laqm.defra.gov.uk/maps/maps_2010.html; Accessed: July 2015.

⁶¹ Long-term concentrations are usually described by the annual average concentration. Short-term concentrations refer to those which are measured as daily or hourly averages and for which air quality standards refer to peak concentrations.

7.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 7.4.1 Emissions to the atmosphere will be controlled and managed during construction through route-wide implementation of the CoCP where appropriate. The draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000) includes a range of mitigation measures that are reported by the IAQM as being suitable to reduce impacts to as low a level as reasonably practicable. These measures are generally sufficient to avoid any significant effects from dust during construction. The draft CoCP also makes provision for the preparation of a LEMP that will set out how the project will adopt and deliver the required environmental and community protection measures within each area through the implementation of specific measures required to control dust and other emissions from activities in the area.
- 7.4.2 The assessment has assumed that the general measures detailed in Section 7 of the draft CoCP will be implemented. These include:
- contractors being required to manage dust, air pollution, odour and exhaust emissions during construction works;
 - inspection and visual monitoring, undertaken in consultation with the local authorities, to assess the effectiveness of the measures taken to control dust and air pollutant emissions;
 - cleaning (including watering) of vehicle routes and designated vehicle waiting areas to suppress dust;
 - the use of water spray systems on demolition sites to dampen down fugitive dust, given that demolitions will occur over a wide area and will be in close proximity to receptors;
 - keeping soil stockpiles away from sensitive receptors where reasonably practicable, also taking into account the prevailing wind direction relative to sensitive receptors; and
 - the use of enclosures to contain dust emitted from construction activities.

Assessment of impacts and effects

Temporary effects

- 7.4.3 Impacts from construction of the revised scheme could arise from dust-generating activities and emissions from construction traffic. As such, the assessment of construction impacts has been undertaken for human receptors for dust and exposure to NO₂ and PM₁₀ concentrations.
- 7.4.4 In the Euston area, demolition and construction sites at and around the station and approach will give rise to dust emissions. Excavation and earthworks will be sources of dust, as will vehicle movements within the sites. Movement of vehicles off site has the potential to transfer dust and/or mud onto local road surfaces.

- 7.4.5 The assessment of construction dust risk identified the requirement for mitigation measures appropriate for a high risk site⁶². With the implementation of these measures (contained in the draft CoCP), no significant effects are likely from dust generating activities. The basis for this conclusion can be found in SES2 and AP3 ES Volume 5 Appendix AQ-001-00, where the scale of dust emissions and their proximity to receptors is fully described.
- 7.4.6 Construction activity could also affect local air quality through the additional traffic generated on local roads as a result of construction traffic routes and through changes to traffic patterns arising from temporary road diversions.
- 7.4.7 The assessment of construction traffic emissions has been undertaken for each construction scenario as described in section 7.2 for a 'without scheme' and a 'with scheme' scenario.
- 7.4.8 Examination of the changes in traffic flows along the affected roads has identified some areas that meet the criteria for a more detailed assessment, as set out in the SMR Addendum 3 (Volume 5: Appendix CT-001 -000/4).
- 7.4.9 The assessment identified a number of receptors where there may be moderate or substantial air quality impacts – some adverse and some beneficial – due to changes in traffic flows, road closures and diversions during construction. Some receptors have both adverse and beneficial effects, as three different scenarios are assessed. In these cases, only the adverse effects are reported here, on a conservative basis. Details of all the predicted effects are presented in Volume 5: SES2 and AP3 ES Appendix AQ-001-001.
- 7.4.10 Locations where significant beneficial effects for NO₂ in Stage A will occur are at assessed receptors⁶³ along: Drummond Street, Gordon Street, Granby Terrace, Tavistock Square, Bedford Way, North Gower Street, Mornington Street and Mornington Place.
- 7.4.11 Locations where significant adverse effects for NO₂ in Stage A will occur are at assessed receptors:
- along Grays Inn Road, Euston Road, Marylebone Road and A5 Edgware Road;
 - to the south of Euston Road, at Gower Street, Hallam Street, Whitfield Street, Carlisle Street, Romilly Street, Hollen Street, Woburn Place, Hunter Street and Judd Street;
 - to the west of Euston station, at Aberdeen Place, St John's Wood Road, Outer Circle, Albany Street, Park Road, Augustus Street, Hampstead Road, Robert Street, Varndell Street, Park Village West, Stanhope Street, North Gower Street and Park Square East;
 - to the east and north-east of Euston station, at Eversholt Street, Polygon

⁶² As defined in the IAQM guidance – a high-risk site is one where a combination of factors relating to dust emissions during construction, demolition, earthworks and/or vehicle movements, in conjunction with the sensitivity, number and proximity of receptors, place the site in the highest risk category according to the IAQM methodology.

⁶³ An 'assessed receptor' is normally a residential property chosen to be representative of the worst effects of air pollution along a road. The fact that an 'assessed receptor' is predicted to experience an adverse effect does not mean that all properties in the same road will be similarly affected.

Street, Phoenix Road, Ossulston Street and Chalton Street; and

- to the north of Euston station, at Mornington Crescent, Harrington Square, Barnby Street, Parkway, Delancey Street, Prince Albert Road, Bayham Street and Arlington Road.

7.4.12 Locations where significant beneficial effects for short-term PM₁₀ concentrations will occur are at assessed receptors along Gordon Street.

7.4.13 Locations where significant adverse effects for short-term PM₁₀ concentrations will occur are at assessed receptors along: Dukes Road, Euston Road, Euston Square, Euston Street and Upper Woburn Place.

7.4.14 All of these effects are predicted based on the use of several conservative assumptions, including: 2017 baseline emissions; the peak flows in the construction programme and that these flows would occur for an entire year.

Permanent effects

7.4.15 No permanent effects on air quality are likely to arise during construction of the revised scheme in Stage A.

Cumulative effects

7.4.16 The data used for the air quality assessment take account of predicted changes in traffic, which are derived from a combination of regional traffic growth factors and consideration of major committed developments, as described in Section 15. In this way, the assessment accounts for cumulative effects.

Other mitigation measures

7.4.17 No other mitigation measures during construction of the revised scheme are proposed in relation to air quality in this area.

Summary of likely residual significant effects (2017–2026)

7.4.18 The methods outlined within the draft CoCP are considered effective at reducing dust emissions and no significant residual effects are considered likely from dust emissions.

7.4.19 Temporary changes in traffic flows, road closures and diversions during construction of the revised scheme will result in both beneficial and adverse air quality effects.

7.4.20 Temporary reductions in NO₂ concentrations will result in beneficial air quality residual effects along Drummond Street, Gordon Street, Granby Terrace, Tavistock Square, Bedford Way, North Gower Street, Mornington Street and Mornington Place.

7.4.21 Temporary increases in NO₂ concentrations will result in adverse air quality residual effects on roads around Euston station, as well as Grays Inn Road, Euston Road, Marylebone Road, the A5 Edgware Road and other main roads south of Euston Road.

7.4.22 Concentrations of PM₁₀ will temporarily reduce on Gordon Street, resulting in a beneficial air quality residual effect. Temporary increases in PM₁₀ concentrations will result in adverse air quality residual effects along Dukes Road, Euston Road, Euston Square, Euston Street and Upper Woburn Place.

7.5 Effects arising during Stage B1 construction and operation (2026–2033)

7.5.1 As noted in section 7.2, the assessment of air quality effects in Stage B1 is presented as a single assessment, combined for construction and operation.

Avoidance and mitigation measures

7.5.2 The same avoidance and mitigation measures as in construction Stage A will be implemented for the construction Stage B1 of the revised scheme.

7.5.3 No specific mitigation measures are proposed during operation in relation to the air quality effects in the Euston area. However, improvements in the accessibility of the station, better pedestrian links, the provision of additional cycle parking and other design measures aimed at creating greener transport infrastructure are likely to result in beneficial effects on air quality.

Assessment of impacts and effects

Temporary effects

7.5.4 Impacts from the combination of construction and operation of the revised scheme in Stage B1 could arise from dust-generating activities and emissions from traffic. As such, the assessment of construction impacts has been undertaken for human receptors for dust and exposure to NO₂ and PM₁₀.

7.5.5 Demolition in the conventional station, and the ongoing use of construction compounds and work sites during construction Stage B1, will give rise to dust emissions. Excavation and earthworks will be sources of dust, as will vehicle movements within the sites. Movement of vehicles off site has the potential to transfer dust and/or mud onto local road surfaces.

7.5.6 The assessment of construction dust risk identified the requirements for mitigation measures appropriate for a high risk site⁶⁴. With the implementation of mitigation measures contained within the draft CoCP, no significant effects are likely to arise from the dust generating activities. The basis for this conclusion can be found in SES2 and AP3 ES Volume 5 Appendix AQ-001-00 where the scale of dust emissions and their proximity to receptors is fully described.

7.5.7 Construction activity could also affect local air quality through the additional traffic generated on local roads as a result of construction traffic routes and through changes to traffic patterns arising from temporary road diversions.

7.5.8 The assessment of the effects on air quality arising from traffic emissions has been undertaken for the peak year in the combined construction and operation period for a 'without revised scheme' and a 'with revised scheme' scenario (see Section 7.2).

7.5.9 Examination of the changes in traffic flows along the affected roads has identified some areas that meet the criteria for a more detailed assessment, as set out in the SMR Addendum 3 (SES2 and AP3 ES Volume 5: Appendix CT-001-000/4).

⁶⁴ As defined in the IAQM guidance – a high-risk site is one where a combination of factors relating to dust emissions during construction, demolition, earthworks and/or vehicle movements, in conjunction with the sensitivity, number and proximity of receptors, place the site in the highest risk category according to the IAQM methodology.

- 7.5.10 The assessment identified a number of receptors where there may be moderate or substantial air quality impacts from traffic due to changes in traffic flows, road closures and diversions during the combined construction and operation in Stage B1. In some cases these impacts are beneficial and lead to a decrease in air pollution at the receptor, but in others there are adverse impacts. Details of all the predicted effects are presented in SES2 and AP3 ES Volume 5 Appendix AQ-001-00.
- 7.5.11 Locations where significant beneficial effects for NO₂ will occur in Stage B1 are at assessed receptors along: Bloomsbury Place; Endsleigh Gardens; Gordon Street; Southampton Row; Russell Square; and Tavistock Place.
- 7.5.12 Locations where significant adverse effects for NO₂ will occur in Stage B1 are at assessed receptors along: Euston Road; Marylebone Road; Upper Woburn Place; Albany Street; Hampstead Road; Euston Street; Gower Street; Grays Inn Road; and Eversholt Street.
- 7.5.13 No significant effects are predicted for PM₁₀.
- 7.5.14 These impacts are predicted based on the use of several conservative assumptions, including: 2026 baseline emissions; the peak flows in the combined construction and operation scenario and that these flows occur for an entire year.
- 7.5.15 The assessment of combustion plant emissions has shown that the future station boilers are likely to cause only negligible increases in NO₂ concentrations. The assessment showed that the flues of the proposed boilers will be of sufficient height to ensure effective dispersion. Therefore, no significant effects are anticipated from their operation.

Permanent effects

- 7.5.16 Permanent effects arising from the operation of the revised scheme only are not isolated from the construction effects in the scenario modelled for the post-2026 period. Any effects from the operation of the revised scheme are likely to be less adverse than those assessed in the combined Stage B1 construction and operation scenario. This is because the operation-only scenario does not contain the effects of the construction HGVs associated with the revised scheme.

Cumulative effects

- 7.5.17 The data used for the air quality assessment take account of predicted changes in traffic, which are derived from a combination of regional traffic growth factors and consideration of major committed developments, as described in Section 15. In this way, the assessment accounts for cumulative effects.

Other mitigation measures

- 7.5.18 No other mitigation measures during the combined construction and operation of the revised scheme are proposed in relation to air quality in this area.

Summary of likely residual significant effects

- 7.5.19 The methods outlined within the draft CoCP are considered effective at reducing dust emissions and no significant residual effects are considered likely from dust emissions.

- 7.5.20 Changes in traffic flows, road closures and diversions during construction and operation of the revised scheme will result in both beneficial and adverse air quality effects.
- 7.5.21 Mainly temporary reductions in NO₂ concentrations will result in beneficial air quality residual effects along Bloomsbury Place, Endsleigh Gardens, Gordon Street, Southampton Row, Russell Square and Tavistock Place. Mainly temporary increases in NO₂ concentrations will result in adverse air quality residual effects and will occur along: Euston Road; Marylebone Road; Upper Woburn Place; Albany Street; Hampstead Road; Euston Street; Gower Street; Grays Inn Road; and Eversholt Street.
- 7.5.22 Whilst these effects are residual, they should be seen in the context of future improvements in background air quality brought about by continued reductions in vehicle emissions, which are expected to reduce NO₂ concentrations beyond 2026.
- 7.5.23 No significant air quality residual effects are predicted for PM₁₀ concentrations.

7.6 Effects arising during operation (2033 onwards)

- 7.6.1 For the purposes of this assessment, operation means the operation of Phase One of HS2 after the end of Stage B1 construction.
- 7.6.2 The effects arising during operation from 2033 are expected to result in fewer locations, if any, experiencing a significant adverse effect on air quality, than predicted for Stage B1. This is because the impact of construction is the dominant contributor to air quality impacts in the combined B1 construction and operation scenario, and so operation considered in isolation must have lower impacts. In addition, the operation only scenario will also be further into the future when vehicle emissions will have fallen still further.
- 7.6.3 Any residual effects for operation should be considered in the context of the future improvements in background air quality brought about by continued reductions in vehicle emissions. Defra is currently preparing new air quality plans to achieve compliance with the annual mean air quality standard for NO₂, earlier than the previously expected compliance date of post-2030. According to the methodology followed, adverse effects for air quality are largely dependent on increases in ambient concentrations where the air quality standard is already breached. Should the revised air quality plan produced by Defra result in an accelerated improvement in air quality in Central London, then there may be fewer adverse effects than predicted in this assessment. The Ultra Low Emission Zone, confirmed by the Mayor of London to start in September 2020, to cover the Congestion Charge zone, just to the south of Euston station, has been cited by
- 7.6.4 Defra as being likely to make an important contribution to such air quality improvements⁶⁵.

⁶⁵ https://www.supremecourt.uk/decided-cases/docs/UKSC_2012_0179_Judgment.pdf. Extract from Supreme Court judgement: 'According to Ms Barton (on behalf of Defra), the Government has since 2011 committed over £2 billion in measures to reduce transport emissions. Other initiatives are being developed at local level. One example is what she describes as a "game-changing" proposal by the Mayor of London, published on 27 October 2014, for an "Ultra-Low Emission Zone" (ULEZ) in Central London from 2020.'

8 Community

8.1 Introduction

- 8.1.1 This section reports the impacts and likely significant effects on local communities resulting from the construction and operation of the revised scheme.
- 8.1.2 Key issues relating to the community for this study area comprise:
- impacts on the amenity of residential properties during construction: in Regent's Park Estate, Cobourg Street, Starcross Street; in the Amptill Estate; in Park Village East and the area around Mornington Terrace;
 - impacts on the operation of community facilities during construction;
 - demolition of residential properties on the Regent's Park Estate, in Harrington Street, Cobourg Street, Euston Street and Melton Street;
 - demolition of the Old Tenants Hall and Wolfson House;
 - permanent loss of open space and play areas;
 - temporary loss of use of Euston Square Gardens; and
 - temporary closure of vehicular access to residential properties on Park Village East.
- 8.1.3 Further details of the community assessments and write-ups of open space surveys and surveys of footpaths used by the public, undertaken within the CFA, are contained in Volume 5 of the main ES: Appendix CM-001-001 and SES2 and AP3 ES, Volume 5: Appendix CM-001-001.
- 8.1.4 Significantly affected community resources are shown in Maps CM-01-001 to CM-01-005 (SES2 and AP3 ES, Volume 5: Community Map Books).
- 8.1.5 The current assessment draws upon information gathered from local and regional sources including: LBC, UCL and Maria Fidelis Convent School.

8.2 Scope, assumptions and limitations

- 8.2.1 The assessment scope, key assumptions and limitations for the community assessment are set out in Volume 1 of the main ES, the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.
- 8.2.2 In some cases where significant amenity effects have been identified as a combination of HGV traffic and air quality effects, it is not possible to be precise about the geographical extent of the combined effect. As a result, these effects are not shown on the Volume 5 Maps (CM-01-007b-CM-01-008-R1).
- 8.2.3 Due to the large number and relatively high density of cafes, restaurants and public houses in the study area, impacts on these resources are only considered where the nearest alternative resources are over 1km away.
- 8.2.4 The assessment also reflects changes in methodology from topics that inform the assessment of amenity effects. For example, the use of the updated CLOHAM

transport model, with consequent changes to predicted traffic flows and air quality modelling.

- 8.2.5 A number of temporary and permanent utility diversions are proposed in locations described in Section 5 and these have been assessed within the constraints of the available information. Reasonable assumptions have been made, for instance the assessment has assumed that where multiple diversions will occur in the same area the works will be combined, where practicable, to minimise disturbance.

8.3 Environmental baseline

Existing baseline

- 8.3.1 Baseline data on community resources was collected up to 500m from the centre line of the revised scheme and, additionally, for up to 250m from the boundary of land required for construction.
- 8.3.2 The study area includes the area of land required both temporarily and permanently for the construction and operation of the revised scheme, together with a wider corridor within which receptors or resources could be affected by a combination of significant residual effects, such as noise, vibration, construction dust, poor air quality and visual intrusion. In addition, the study area has regard to the proposed routing of construction traffic and takes account of catchment areas for community facilities, which could be affected where crossed by the revised scheme.
- 8.3.3 The area is urban and is characterised by a mixture of housing estates, offices and buildings associated with UCL centred on Euston station. It is a major transport interchange and a terminus for intercity and local trains. The station is served by the WCML as well as two LU lines. These are the Victoria line and the Northern line (Charing Cross and Bank branches). Euston Square underground station is about 300m from Euston station, west along Euston Road. There is a bus station served by 12 bus routes south of the main entrance to Euston station. The station contains restaurants, cafes and shops. The A501 Euston Road is the main road in the area. The King's Cross Growth Area is located to the east of Euston station where major redevelopment is underway for new homes, offices and retail outlets.
- 8.3.4 This study area includes:
- the area to the south and west of the existing Euston station;
 - the area to the east of the existing Euston station; and
 - the area north of Granby Terrace.

Area south and west of the existing Euston station

- 8.3.5 The area west of Euston station between the station and Regent's Park is characterised by a mixed business and residential community. The western portion of the area is the mainly residential Regent's Park Estate, while buildings associated with UCL characterise the area to the south-west and south of the station. Many of the buildings in the area are medium to high rise blocks. There are also shops and restaurants on Drummond Street and the Surma Centre on Robert Street, which provides a focus for the local Bangladeshi community. The Shahjalah Jame Mosque is

located on North Gower Street. The Royal Asiatic Society and the Centre for the Magic Arts are located on Stephenson Way.

- 8.3.6 The area surrounding the station is well known for its mix of restaurants and shops and is frequented by local people and station users. There are community facilities in the area including shops, public houses, places of worship, health facilities and other services.
- 8.3.7 Regent's Park Estate is a housing estate with a mixture of social and private housing. The estate has community facilities including the Old Tenants Hall on Harrington Street, the Dick Collins Community Hall on Redhill Street and the Samuel Lithgow Youth Centre on Stanhope Street. There are also areas of open space within the Regent's Park Estate including Hampstead Road Open Space and Eskdale play area.
- 8.3.8 The Maria Fidelis Convent School serves a large catchment and is split across two campuses: the lower school and the upper school. The lower school is located on North Gower Street to the west of Euston station. The upper school is on Phoenix Road to the east of the station. The lower school is located about 1km from the upper school and it is a 10-15 minute walk between the two campuses.
- 8.3.9 Other education facilities in the area include: Netley Primary School; Christ Church Church of England (CE) Primary School on Redhill Street and the Regent's Park Children's Centre. Dr Williams's Library (Congregational Library) is also located on Gordon Square, south of the Euston Road. Further west, Francis Holland Schools is located on Ivor Place, off the A41 Park Road. UCL owns several buildings to the south-west and south of Euston station, including Wolfson House on Stephenson Way. UCL also has short-term leases on other buildings, such as 132-140 Hampstead Road.
- 8.3.10 Euston Square Gardens is located in front of Euston station, split into two areas separated by the access to the bus station. In addition, St James's Gardens on Cardington Street, west of Euston station, is a public open space located between the National Temperance Hospital and Maria Fidelis Convent (Lower) School.

Area east of the existing Euston station

- 8.3.11 The area east of Euston station, within Somers Town, is characterised by blocks of social housing, including the high-rise Amptill Estate, interspersed with community facilities including Amptill Square Tenants Hall, places of worship, schools, shops, public houses, the British Library, youth and community centres, health care facilities and open space such as Harrington Square, a playground off Barnby Street and a playground off Lancing Street. Schools in the area include: Maria Fidelis Convent (Upper) School; St Aloysius' Infant and Junior Schools on Phoenix Road; Regent High School on Charrington Street and St Mary and St Pancras Church of England Primary School on Werrington Street.

Area north of Granby Terrace

- 8.3.12 The area north of Granby Terrace is a residential area characterised by Georgian terraced housing known as Park Village. It is bordered to the west by Albany Street and to the east by the existing railway. There are few community facilities in the area apart from the Cumberland Market Tenants Hall located off Park Village East.

Future baseline

Construction (2017-2026)

- 8.3.13 SES2 and AP3 ES Volume 5: Appendix CT-004-000 provides details of the developments, additional to those identified in the main ES, that are assumed to have been implemented by the start of the main construction and any that are likely to be built at the same time as the revised scheme. These developments may introduce new residents and community facilities to the study area and may therefore be impacted by the construction and operation of the revised scheme.
- 8.3.14 The redevelopment of Netley Primary School on William Road is likely to be implemented before 2017. It involves the remodelling of the school with new specialist education facilities, 80 homes and public realm improvements. Seventy of the homes have been acquired by HS2 Ltd to provide part of the social housing required to replace that on the Regent’s Park Estate and Cobourg Street that will be demolished for HS2.
- 8.3.15 A planning application 2015/3076/P has been submitted by LBC to provide additional homes within the Regent’s Park Estate, under an agreement with DfT. A total of 116 homes are proposed to be developed on eight sites in two phases. The first phase, to be complete by 2018, comprises 95 homes on six sites. The development includes the demolition and reprovision of the Dick Collins Community Hall (which will also replace the Old Tenants Hall) , as well as a replacement public house, two commercial units on Hampstead Road and improvements to communal gardens, public realm and open space in Regent’s Park Estate. LBC has identified that 66 of these homes are needed to replace social housing on the Regent’s Park Estate and in Cobourg Street that will be acquired and demolished for HS2.

Construction and operation (2026–2033)

- 8.3.16 The review of future baseline conditions has not identified any committed developments within the study area, which are likely have been completed by 2026.

Operation (2033 onwards)

- 8.3.17 No additional committed developments have been identified in this area that will materially alter the baseline conditions in 2033.

8.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 8.4.1 Areas of public open space and replacement play areas in the proposed open space north and east of Langdale have been incorporated into the revised scheme design as part of the design development process. This area includes the area currently occupied by Eskdale play space and part of the area currently occupied by Hampstead Road open space.
- 8.4.2 The draft CoCP includes a range of provisions that will help mitigate community effects associated with construction within this area, including the following (see Volume 5 of the main ES: Appendix CT-003-000):
- appointment of community relations personnel (draft CoCP, Section 5);

- community helpline to handle enquires from the public (draft CoCP, Section 5);
- sensitive layout of construction sites to minimise nuisance (draft CoCP, Section 5);
- where reasonably practicable, maintenance of public rights of way for pedestrians and cyclists around the perimeter of construction sites and across entry and exit points (draft CoCP, Section 5);
- a requirement for contractors to pay due consideration to the impacts of extreme weather events and related conditions which may affect community resources during construction (draft CoCP, Section 5);
- specific measures in relation to air quality and noise will also serve to reduce impacts for the neighbouring communities including discretionary noise insulation for sensitive community resources and, in special circumstances, temporary rehousing (draft CoCP, Sections 7 and 13);
- measures to be implemented to reduce construction traffic impacts or impacts associated with parking on residential streets (draft CoCP, Section 14); and
- where practicable, the avoidance of large goods vehicles operating adjacent to schools during drop off and pick up periods (draft CoCP, Section 14).

Assessment of impacts and effects

- 8.4.3 Details of all assessments of community resources are included in Volume 5 of the main ES and SES and AP3 ES Volume 5: Appendix CM-001-001. These explain the rationale for determining the rating for sensitivity of the affected community resource, magnitude of impact and the assessment of significance.

Area south and west of the existing Euston station

Temporary effects

Residential property

- 8.4.4 Construction Stage A for the revised scheme at Euston will take place over a ten year period. As a result, residential properties in Regent's Park Estate (east of Augustus Street) are predicted to experience in-combination effects during the Stage A construction period. These will affect the residential blocks of Langdale, Cartmel, Coniston, The Tarns and Augustus House. In addition, the proposed replacement housing block in front of Newlands (at the corner of Hampstead Road and Varndell Street) will experience in-combination effects. The combined effects will be significant construction noise and visual effects. This will affect approximately 295 residential properties in this area. The combination of these effects, which will coincide for up to five years, will result in a major adverse effect on the amenity of residents, which is significant.
- 8.4.5 The programme to extend and refurbish Euston station (including undertaking utility works in the surrounding area) will be coordinated from the National Temperance Hospital main compound and will take place over a ten year period in Stage A. As a result, nearby residential properties (10-20) at the northern end of Cobourg Street and at the eastern end of Starcross Street are predicted to experience a combination of significant noise and visual effects. The combination of these effects, which are

expected to coincide for up to five years, will result in a major adverse effect on the amenity of residents, which is significant.

- 8.4.6 Significant road noise effects and air quality effects will combine on approximately 100 dwellings on Robert Street. The combination of these effects, which will occur during peak construction months in 2023, will result in a moderate adverse effect on the amenity of residents, which is significant.
- 8.4.7 Approximately 70 dwellings on Varndell Street are predicted to experience in-combination effects associated with a significant increase in HGV movements, significant air quality effects and significant road noise effects. The combination of these effects, which will occur during peak construction months in 2018, will result in a major adverse effect on the amenity of residents, which is significant.
- 8.4.8 To the west of the station at Euston, increases in HGV movements as a result of construction and traffic diversions as a result of road closures will also create in-combination effects on A4201 Albany Street, A501 Euston Road (Euston Circus slip), A41 Baker Street (Park Road to Marylebone Circus) and A41 Park Road (junction with A5025 to junction with Rossmore Road). A significant increase in HGV movements and the associated air quality effects will result in a significant in-combination effect. The combination of these effects will result in a major adverse effect on the amenity of residents along these sections of road, which is significant.
- 8.4.9 To the south of Euston Road, the significant increase in HGV movements combined with significant noise effects is predicted to result in a combined effect on properties adjacent to the road at Bidborough Street and Cartwright Gardens. The combination of these effects, which will occur during peak construction months in 2023, will result in a major adverse effect on the amenity of residents, which is significant.
- 8.4.10 The combination of a significant increase in HGV movements and significant air quality effects will combine at Mabledon Place (near Bidborough Street); A400 Gower Street/Bloomsbury Street (Euston Road to Torrington Place); Grafton Way and Coram Street. The combination of these effects will result in a major adverse effect on the amenity of residents along these sections of road, which is significant.

Community facilities

- 8.4.11 Utility works in part of the grounds of Maria Fidelis Convent (Lower) School are expected to take a maximum of three months to complete. However, the nature and location of these utility works, considered alone, means that the impacts will not result in a significant effect.
- 8.4.12 The school is based on two sites and lesson timetabling seeks to reduce the need to move between sites. Only a small number of older pupils (based at the upper school) are required to use the facilities at the lower school. Teachers do move between the sites and the current preferred access route is across the front of the existing station. The construction works will disrupt and may extend the current route through Euston station. As a result, there may be a very small increase in journey times between the two sites, but this impact is not considered to result in a significant effect.
- 8.4.13 The construction works will border two sides of the Maria Fidelis Convent (Lower) School. The adjacent National Temperance Hospital construction compound will be used as the main construction base for the Euston works during construction Stage A.

- 8.4.14 Section 14, Sound noise and vibration, identifies significant noise effects that will affect the outside areas that the school uses for teaching, associated with utility works and demolitions and to a lesser extent retaining wall and bridge construction. Section 14 also identifies the mitigation measures that will be put into place to reduce adverse noise impacts.
- 8.4.15 The assessment of amenity effects considers the combination of effects arising in other disciplines. The visual and air quality assessments do not identify significant residual effects at this location. Therefore, no significant in-combination effects on the staff and pupils at the school have been identified in this assessment.
- 8.4.16 There will be no significant community effects on Netley Primary School.
- 8.4.17 There will be no significant community effects on the Surma Centre at Robert Street or the Regent's Park Children's Centre. Along the A401 Albany Street, a significant increase in HGV movements and significant air quality effects are predicted at Christ Church Primary School (entrance on Redhill Street). Along the A41 Park Road, the same combination of effects is predicted at Francis Holland School (entrance on Ivor Street). The combination of effects on the children, staff and parents using the schools is predicted to result in a major adverse effect on their amenity and will be significant.
- 8.4.18 The combination of significant traffic, noise effects and air quality effects will combine to result in a significant effect on a dental practice, located on Robert Street. The combination of these effects, which will occur during peak construction months in 2018 and 2023, will result in a moderate adverse effect on the amenity of staff and users, which is significant.

Open space

- 8.4.19 Euston Square Gardens (both eastern and western parts) will not be available as an area of public open space for the duration of the construction period. Euston Square Gardens is an area of open space used by commuters, the local workforce and residents. Its location means that it is one of the most heavily used open spaces in LBC. Some of the existing mature trees will be retained and the gardens will be reinstated after construction is completed in 2033. The effective loss of the gardens for the entire construction period will have a major adverse effect on the community and is significant.

Permanent effects

Residential property

- 8.4.20 Construction of a high speed station at Euston and widening of the station approach will require the demolition of 220 dwellings. These include properties on the Regent's Park Estate comprising three medium rise blocks: Silverdale (69 dwellings), Eskdale (60 dwellings) and Ainsdale (39 dwellings) which are social rented or leasehold housing. In addition, Stalbridge House (20 private dwellings) and Granby House (5 private dwellings) will be demolished.
- 8.4.21 The community immediately west of the existing station will also be affected by demolitions of residential property. The properties to be demolished are listed in

Section 5 and include properties at Cobourg Street (18 dwellings), Euston Street (five dwellings) and Melton Street (three dwellings).

- 8.4.22 DfT has made agreements with LBC that will secure the replacement of 136 social rented housing units to be demolished on the Regent's Park Estate and in Cobourg Street. It is understood that LBC also proposes to provide some shared equity housing in these developments for resident leaseholders displaced from the demolished properties owned by LBC.
- 8.4.23 It is intended that the replacement social housing, 66 homes on Regent's Park Estate and 70 at the Netley School, will be available for the phased rehousing of occupiers from the buildings to be demolished by the end of 2017.
- 8.4.24 Generally, private homeowners (including leaseholders) will be compensated for the compulsory acquisition of their property interests, in accordance with the National Compensation Code.
- 8.4.25 Taking account of the replacement of social housing, there will still be a net loss of leasehold and other private housing in the area and disruption for those rehoused and this will remain as a major adverse effect on the local community and is significant.

Community facilities

- 8.4.26 Widening of the railway cutting to accommodate the revised scheme will require the demolition of the Old Tenants Hall off Harrington Street, located between Silverdale and Ainsdale on the Regent's Park Estate. The primary function of the hall is to provide a home to the Silverdale Motorcycle Project. The project is focused on motorbike riding, maintenance and road safety and is aimed at 13-19 year olds. Run by LBC, the project is used by 'at risk' young people who are going through the youth justice system (reparation) or by direct referrals from social services or education institutions. The project also provides outreach services in the Regent's Park Estate and has links with the local community centres. No similar projects operate nearby and there is demand from across Camden and other London boroughs. No suitable premises for relocation have been identified at this time. The loss of this hall will have a major adverse effect on the community and will be significant.
- 8.4.27 As part of the planning application for replacement housing, the Dick Collins Community Hall will be demolished and a replacement hall will be provided. The replacement hall will meet the needs of users of both the existing Dick Collins Hall and the Old Tenants Hall at Silverdale. HS2 is working with LBC to identify suitable premises to accommodate the Silverdale Motorcycle Project.
- 8.4.28 UCL operates two educational facilities that will be demolished to construct the revised scheme: 132-140 Hampstead Road and Wolfson House (4 Stephenson Way). UCL has recently taken a short-term lease of 132-140 Hampstead Road, for use as temporary teaching facilities, while another building is redeveloped. UCL is aware that this latter building will be demolished to make way for the revised scheme and that alternative arrangements will be necessary. As the proposed educational use for this building is for a temporary period only, the demolition of it is not considered to be a significant effect. In addition to educational uses, Wolfson House provides technical support services for other UCL premises and plays an important role in supporting UCL's educational infrastructure. Therefore, the demolition of Wolfson House will

have a major adverse effect and is significant. UCL also occupies office space in the Podium building on Eversholt Street, which will be used as construction offices for the revised scheme. The impacts of loss of office space are considered in Section 13, Socio-economics.

Open space

- 8.4.29 The loss of open space and play facilities to the south and west of the existing station will be for a period of up to 17 years. Although the staged re-provision of facilities will occur, following construction, the effects have been considered to be permanent, because of the long duration of the deficit of provision.
- 8.4.30 The area currently occupied by St James's Gardens will form a new entrance – Cobourg Street station entrance – and forecourt to the high speed station, with some public realm. The majority of the local features of St James's Gardens will be re-provided in two stages after construction on a site in the north-east of the Regent's Park Estate: the proposed open space north of Langdale (see SES2 and AP3 ES, Volume 2 CFA1 Map Book, Map CT-06-001). This will include a MUGA, children's play area, landscaped areas and benches. The new areas of open space are further north than the original St James's Gardens but will remain accessible to residents in Regent's Park Estate. Although the re-provided open space north of Langdale is smaller than the total area lost from St James's Gardens, the main community facilities such as the MUGA and playground will be incorporated. The impact of the loss of these facilities throughout construction Stage A will be a major adverse effect and is significant.
- 8.4.31 Hampstead Road Open Space is located on the west side of Hampstead Road, to the south of Silverdale. The area contains a children's playground, benches and a lawn area and is on land required to construct and operate the revised scheme. Although the users of this resource are mostly those living in adjacent residential blocks that will be demolished, there is still likely to be a demand for this open space and play area, as there are limited nearby alternatives. The children's playground will be re-provided in the proposed open space north of Langdale at the end of Stage A. The loss of the Hampstead Road Open Space is a major adverse effect on the community and is significant.
- 8.4.32 The nearby Eskdale play area is also on land required to construct and operate the revised scheme. This is a children's playground and green space between the residential blocks of Eskdale and Langdale in the Regent's Park Estate (between Stanhope Street and Harrington Street). The playground has children's climbing frames and swings, is surrounded by mature trees and has several benches. The playground and open space serve the people living in the surrounding residential blocks. Similar facilities will be re-provided in the proposed open space north of Langdale. The loss of this resource will result in a major adverse effect on the community and is significant.

Cumulative effects

- 8.4.33 From a community-wide perspective, the combination of residential demolitions, changes to residential amenity, loss of community facilities and open space will have a cumulative effect on the residential community to the south and west of Euston station, in particular the Regent's Park Estate. While the re-provision of social housing

on sites within or close to the estate will offset some of the adverse effects of demolition, there will still be the permanent relocation of a substantial number of residents from the area, which is expected to change how the community functions, for example, changing the demand for the remaining community resources and local businesses.

Area east of Euston station

Temporary effects

Residential properties

- 8.4.34 The construction activity to replace Hampstead Road Bridge and utility works will take place over a six year period. The A400 Hampstead Road overbridge satellite compound (north) will be in use for 11 years and the south compound throughout the construction period to 2033. As a result, residential properties on the Ampthill Estate are predicted to experience in-combination effects during the construction period. The in-combination effects are significant construction noise, air quality and visual effects. This will affect approximately 130 residential properties in this area. The combination of these effects, which will coincide for approximately two years, will result in a major adverse effect on the amenity of residents and is significant.

Community infrastructure

- 8.4.35 The Lancing Street satellite compound is needed for a compensation grouting shaft. The construction site will use the width of the road and land to the east, although pedestrian access will be maintained. This area of land includes a children's playground, to the north of Wellesley House, which could be required for up to six years. The playground serves the surrounding residential blocks and there are few alternatives nearby. The loss of the playground will result in a major adverse effect and is significant.
- 8.4.36 There are utility works planned for Phoenix Road. These will not result in a significant effect on Maria Fidelis Convent (Upper) School or St Aloysius' Infant and Junior schools which are located on this road. In addition, there will be no impacts on St Mary and St Pancras Church of England Primary School on Werrington Street that will result in a significant effect on the community.

Permanent effects

- 8.4.37 No significant permanent effects have been identified.

Cumulative effects

- 8.4.38 No significant temporary or permanent cumulative effects have been identified.

Area north of Granby Terrace

Temporary effects

Residential properties

- 8.4.39 Construction will require the demolition and replacement of a deep retaining wall on the west side of the railway approach at Park Village East. The existing retaining wall between Park Village East and the railway has suffered over time from movement and damage. Construction at Park Village East will require the temporary closure of

vehicular access to properties between numbers 1 and 36 Park Village East. Emergency access will be maintained. The provisions in the draft CoCP associated with parking on residential streets will reduce the impacts associated with a temporary loss of parking. During the closure periods, residents, and the Crown Estate, which is the freeholder, will only be able to access the affected properties on foot. The disruption to Park Village East will extend over a six year period, but vehicular access to individual properties will be provided whenever possible, although access to individual properties may have to be restricted for a period of up to 12 months during the principal works to the retaining wall structures. The demolition and replacement of Mornington Street Bridge will also mean that residents will not be able to gain vehicular access to and from the east, while those works are in progress. There will be continuing discussion with residents in Park Village East in order to identify ways to reduce the impacts of these works. The access restrictions for residents and the duration of the construction works will result in a major adverse isolation effect on the local community which is significant.

- 8.4.40 The residents of Park Village East are predicted to experience in-combination effects during the construction period. The in-combination effects are significant construction noise and visual effects. This will affect over 50 residential properties in this area. The combination of these effects, which will coincide for approximately two years, will result in a major adverse effect on the amenity of residents, which is significant.

- 8.4.41 Residents at Mornington Terrace (approximately 90 properties) are predicted to experience in-combination effects from works in the station approach, including the retaining walls on the west side. The in-combination effects are significant construction noise and visual effects. The combination of these effects, which will coincide for approximately two years, will result in a major adverse effect on the amenity of residents, which is significant.

- 8.4.42 Residents on Mornington Place, Mornington Crescent and Albert Street are predicted to experience in-combination effects related to the same construction works. The in-combination effects are significant construction noise and increase in HGV movements. Properties on Mornington Place and Mornington Crescent will also experience significant visual effects. These effects will combine during the peak construction months of 2018. This will result in a major adverse effect on the amenity of residents, which is significant.

- 8.4.43 Residents on A401 Parkway and Delancy Street (approximately 35 properties) are predicted to experience in-combination effects from a significant increase in HGV movements, significant noise effects and significant air quality effects. The combination of these effects, which are expected to combine for up to 18 months, will have a major adverse effect on the amenity of residents which is significant.

- 8.4.44 The increase in construction traffic associated with construction activity around Euston station will create in-combination effects on Plender Street (Camden High Street to Bayman Street) and Mornington Street (Albert Street to Arlington Street). The residents on these roads are predicted to experience a combination of an increase in HGV movements and air quality effects. The combination of these effects will result in a major adverse effect on the amenity of residents along these sections of road, which is significant.

Community facilities

- 8.4.45 Along the A401 Parkway, the combination of a significant increase in HGV movements and significant air quality effects is predicted to affect the amenity of children, staff and parents accessing North Bridge House Preparatory School. The combination of these effects is predicted to result in a major adverse amenity effect which is significant.

Cumulative effects

- 8.4.46 From a community-wide perspective, residents at Park Village East are expected to experience multiple significant effects, with construction activity restricting access for some properties and combined effects resulting in a change in amenity for a wider group of residents.

Permanent effects

- 8.4.47 No significant permanent effects have been identified.

Cumulative effects

- 8.4.48 No significant permanent cumulative effects have been identified.

Other mitigation measures

- 8.4.49 The assessment has concluded that there are significant adverse effects arising during construction in relation to community resources.
- 8.4.50 HS2 Ltd is seeking to reach agreements with LBC, and liaise with residents and other stakeholders to develop the measures proposed to mitigate or offset a number of the significant effects arising during construction. Some of these measures are described in the following paragraphs.
- 8.4.51 In addition to the re-provision of open space that forms part of the design of the revised scheme, HS2 Ltd and LBC intend to improve existing public open spaces within Regent's Park Estate and on the Amptill Estate in order to mitigate the permanent loss of open space at St James's Gardens, Hampstead Road Open Space and the Eskdale Play Area. Areas identified include Munster Square, Clarence Gardens, Cumberland Market, Hope Gardens and Tolmers Square. There are few opportunities to create new open space in Regent's Park Estate. However, there may be opportunities to bring existing open spaces into the public realm. In addition, appropriate measures for wayfinding from Regent's Park Estate to Regent's Park will be provided.
- 8.4.52 HS2 Ltd proposes to relocate the playground equipment at Wellesley House, Lancing Street, to an adjacent area of vacant land (just to the north of the existing playground), outside the land required for construction of the revised scheme, subject to agreement with LBC.
- 8.4.53 HS2 Ltd will continue to work with Maria Fidelis Convent School and LBC to assist the school's plans to integrate their facilities onto a single site to the east of Euston station, as soon as is reasonably practicable.
- 8.4.54 HS2 Ltd will continue to work with Christ Church CE Primary School, Francis Holland School and North Bridge House Preparatory School and LBC to identify reasonable

practicable measures to mitigate the residual significant amenity effects, including discretionary measures identified in the draft CoCP.

Summary of likely residual significant effects in Stage A

- 8.4.55 There will be a major adverse effect due to the demolition of 220 residential properties, including 168 owned by LBC on the Regent’s Park Estate. The commitment to reprovide social housing will help, in part, to offset this adverse effect, although a significant adverse effect will still remain. Neighbouring residents not affected by demolitions will experience a change in their amenity. Also in Regent’s Park Estate, the construction of the revised scheme will permanently require land occupied by Hampstead Road open space and Eskdale Play area. St James’s Gardens will also be required permanently although the facilities will be reprovided following construction. Land occupied by the Old Tenants Hall is required and this facility will be reprovided, although the Silverdale Motorcycle Project, which has operated from the hall, is not being reprovided.
- 8.4.56 Immediately to the west of the existing Euston station, the construction of the revised scheme will result in the demolition of residential properties on Cobourg Street, Euston Street and Melton Street. The amenity of residents at the remaining properties at the corner of Cobourg Street and Starcross Street is predicted to be affected by nearby construction activity, as will residents at Varndell Street and Robert Street. Also on Robert Street, the users of the dental practice are predicted to experience amenity effects. The UCL premises at Wolfson House will be required permanently.
- 8.4.57 Euston Square Gardens will be occupied by construction compounds throughout the construction period. The playground adjacent to Lancing Street will also be affected for part of the period.
- 8.4.58 To the south and west of Euston Road, amenity effects are predicted to affect residents along several roads, including A4201 Albany Street (including Christ Church CE Primary School), A501 Euston Road (Euston Circus slip); A41 Baker Street (Park Road to Marylebone Circus) and A41 Park Road (junction with A5025 to junction with Rossmore Road – including Francis Holland School); Bidborough Street; Mabledon Place (near Bidborough Street); Cartwright Gardens; A400 Gower Street/Bloomsbury Street (Euston Road to Torrington Place); Grafton Way and Coram Street.
- 8.4.59 To the north of Euston station, residents at Park Village East are predicted to experience temporary isolation and amenity effects. Temporary amenity effects are also expected to affect residents of the Amptill Square Estate. The amenity of residents at Mornington Terrace, Mornington Crescent, Mornington Place, Albert Street, Plender Street, Mornington Street, Parkway and Delancey Street (including North Bridge House Preparatory School) will also be temporarily affected.

8.5 Effects arising during Stage B1 construction and operation (2026–2033)

- 8.5.1 The assessment of impacts and effects for the Stage B1 construction and operation is based on ongoing construction activities, following opening of the western part of the high speed station at the end of 2026. During this period, a further five high speed platforms and the remainder of the eastern side of the high speed station will be

completed over the period to 2033. There will be very limited construction activity north of Hampstead Road during construction Stage B1.

Avoidance and mitigation measures

- 8.5.2 The design of the high speed station and new station entrances will facilitate enhanced pedestrian permeability through the station, which will help to improve accessibility to community facilities.

Assessment of impacts and effects

- 8.5.3 The temporary effects reported for construction Stage A will not continue in construction Stage B1. The exception to this is the temporary loss of Euston Square Gardens, which will continue until the end of Stage B1. This is an adverse effect which is significant.
- 8.5.4 Residents in approximately 50 to 60 properties in the residential blocks of Coniston, Langdale and Augustus House on Regent's Park Estate are predicted to experience in-combination effects from operation of the revised scheme from 2026 onwards. The combination of operational noise and visual effects will result in a major adverse effect on the amenity of residents, which will be permanent and is significant.
- 8.5.5 The revised scheme will support the delivery of the objectives set out in the EAP which identifies substantial capacity in the area to accommodate new housing, commercial and other development linked to existing public transport and future improvements. Further detail can be found in Section 5.

Cumulative effects

- 8.5.6 No significant temporary or permanent cumulative effects have been identified.

Other mitigation measures

- 8.5.7 No further mitigation measures are proposed.

Summary of likely residual significant effects in Stage B1

- 8.5.8 The amenity of approximately 50 to 60 residential properties at Coniston, Langdale and Augustus House on the Regent's Park Estate will, despite the provision of vehicle safety barriers that will act as noise barriers and other measures, be affected permanently by views of and noise arising from the operation of the revised scheme.
- 8.5.9 The loss of Euston Square Gardens for the duration of Stage B1, in addition to stage A1, continues to be a significant effect.

8.6 Effects arising during operation (2033 onwards)

- 8.6.1 The operational effects on the amenity of approximately 50 to 60 residential properties at Coniston, Langdale and Augustus House on the Regent's Park Estate, reported for Stage B1, will be permanent.

9 Cultural heritage

9.1 Introduction

- 9.1.1 This section of the report provides a description of the current baseline for heritage assets and reports the likely impacts and significant effects as a result of the construction and operation of the revised scheme. Consideration is given to the extent and heritage value (significance) of assets including archaeological and palaeo-environmental remains; historic buildings and the built environment and historic landscapes.
- 9.1.2 With regard to heritage assets, the main issue is the extent to which designated and non-designated assets are affected by the revised scheme. Impacts on assets as a result of the revised scheme will occur largely through the physical removal and alteration of assets and changes to their setting.
- 9.1.3 Maps showing the location of the key environmental features can be found in the SES2 and AP3 ES Volume 2: CFA map books. Maps showing the location of all designated and non-designated heritage assets can be found in SES2 and AP3 ES: Volume 5, Cultural Heritage Map Book. Detailed reports on the cultural heritage character and surveys undertaken within the local area are contained in the main ES Volume 5 Appendices. These include:
- Appendix CH-001-001 – Baseline Report;
 - Appendix CH-002-001 – Gazetteer of Heritage Assets; and
 - Appendix CH-003-001 – Impact Assessment Table.
- 9.1.4 Updates to these reports as a result of SES2 and AP3 ES design changes are provided in SES2 and AP3 ES: Volume 5 Appendices. These include:
- Appendix CH-002-001 – Gazetteer of Heritage Assets; and
 - Appendix CH-003-001 – Impact Assessment Table.
- 9.1.5 Throughout this section, assets within the study areas are identified with a unique reference code, EUSXXX; further detail on these assets can be found in the gazetteer in SES2 and AP3 ES Volume 5: Appendix CH-002-001.
- 9.1.6 Engagement was undertaken during the preparation of the main ES. The consultees with whom the original scheme was discussed are listed below:
- Greater London Archaeological Advisory Service;
 - Historic England (formerly English Heritage) historic buildings advisor for London;
 - LBC conservation officer;
 - conservation area advisory committees;
 - Camden Railway Heritage Trust.

9.2 Scope, assumptions and limitations

- 9.2.1 The assessment scope, key assumptions and limitations for the cultural heritage assessment are 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. This report follows the standard assessment methodology. There have been no changes to this methodology since the production of the main ES.
- 9.2.2 The setting of all designated heritage assets within the zone of theoretical visibility (ZTV)⁶⁶ has been considered. The study area within which a detailed assessment of all assets, designated and non-designated, has been carried out, is defined as the land required, temporarily or permanently, to construct the revised scheme plus 250m. For the purposes of this assessment, any assets within the 10mm settlement contour⁶⁷ are included within the assessment.
- 9.2.3 The cultural heritage methodology includes the consideration of the intra-project effects of a number of technical topic assessments, for example, landscape and visual, ecology and water resources and flood risk. Consequently, these interactions have been included in the assessment of impacts and effects.
- 9.2.4 In undertaking the assessment, a limitation was identified in that not all areas identified in the archaeological risk model⁶⁸ were available for survey.
- 9.2.5 However, non-intrusive field survey was undertaken in a number of areas to provide data regarding the nature of subsurface archaeological assets. Information from other sources of data, including the Historic Environment Record and local archives was utilised to provide information relating to the potential archaeological assets that may be present.

9.3 Environmental baseline

Existing baseline

- 9.3.1 In compiling this assessment, documentary baseline data was collected from a variety of sources as set out in the main ES Volume 5: Appendix CH-001-001.

Designated assets

- 9.3.2 The following designated heritage assets are located partially or wholly within the land required, temporarily or permanently, for the construction of the revised scheme (see Appendix CH-01-001 to CH-01-004a in the SES2 and AP3 ES: Volume 5, Cultural Heritage Map Book):
- two Grade II* listed buildings:
 - the War Memorial, Euston Square (EUSo42); and
 - the group asset: 2 - 16, 22 - 34, 36A and 36B Park Village East (EUSo03); and

⁶⁶ The ZTV used for this purpose in Greater London was that used for the draft ES and shown on the map series CH – 02 in Volume 5 of the main ES. This covers, in places, a smaller area than the ZTV shown on the map series LV – 07 and LV – 08. It has been concluded that there are no designated assets in the areas outside the draft ES ZTV, the setting of which could be affected by the revised scheme.

⁶⁷ The area in which ground settlement arising from tunnelling or other below ground work could be at least 10mm in depth.

⁶⁸ The archaeological risk model is an approach that enables the identification of those areas of the revised scheme where archaeological assets are known or suspected and provides a mechanism for the prioritisation of the programme of survey.

- 19 Grade II listed buildings:
 - Bentham House, 4-8 Endsleigh Gardens (EUSo22);
 - Euston Square railings and lodges are within Euston Square Gardens (London square) (EUSo04);
 - Southampton Monument, Christie Monument and drinking fountain in St James's Gardens (EUSo14);
 - numbers 14-15 Melton Street (EUSo27);
 - Mornington Street Bridge stone piers, i.e. pillars and associated lamp posts, west and east ends of bridge (EUSo17);
 - the Robert Stephenson statue in Euston station forecourt (EUSo35);
 - Gloucester Gate bridge and statue/drinking fountain, and animal drinking trough opposite Regent's Park Barracks, the York and Albany public house, numbers 119-123 Parkway and number 125 Parkway are within the Regent's Estate area of Regent's Park (Camden) Conservation Area (EUSo12);
 - number 58 Mornington Crescent and animal drinking trough on Hampstead Road are within the Camden Town Conservation Area (EUSo16); and
 - the Parkway Tunnel (also known as the Park Street Tunnel) and cutting (EUSo37); and
- one Grade I registered park and garden: Regent's Park (EUSo02);
- three conservation areas: Camden Town (EUSo16), Bloomsbury (EUSo022); and Regent's Park, Camden, which incorporates part of the Grade I Registered Park (EUSo02) and Nash's planned urban area to the east of the park (EUSo12); and
- three London squares: Euston Square Gardens (EUSo04); Amphil Square Gardens (EUSo18); and Harrington Square (EUSo16).

9.3.3 The following designated assets are located within the ZTV (see CT-10-001, SES2 and AP3 Volume 2, CFA1 Map Book and Appendix CH-02-001 to CH-01-001-L1 in the SES2 and AP3ES: Volume 5, Cultural Heritage Map Book):

- 13 Grade I listed buildings:
 - Chimps' breeding colony/gorilla house, London Zoo (EUSo01); numbers 2-11 Gloucester Gate, numbers 1-10 Cambridge Terrace, numbers 1-42 Chester Terrace, numbers 1-12 Chester Place, numbers 1-4 Cumberland Place, numbers 1-59 Cumberland Terrace and numbers 12-14 Gloucester Gate, are in the Regent's Estate area of Regent's Park (Camden) Conservation Area (EUSo12);
 - St Pancras (New) Church (EUSo15);
 - University Church of Christ King and British Museum, and King Edward VII galleries are within the Bloomsbury Conservation Area (EUSo22); and
 - St Pancras Station and Midland Hotel (EUSo33), and King's Cross Station (EUSo13)

within the King's Cross St Pancras Conservation Area (EUSo13); and

- 25 Grade II* listed buildings:
 - Cumberland footbridge and Elephant and Rhinoceros Pavilion, London Zoo (EUSo01);
 - St John's Lodge, within the registered park and garden of Regent's Park and the Regent's Park (Westminster) Conservation Area (within grouping EUSo02);
 - number 1-19 Park Village West, St George's Greek Orthodox Cathedral, monument in St Katharine's Precinct, the Danish Church, numbers 4 and 5 St Katharine's Precinct, numbers 1-3 and 6-9 St Katharine's Precinct and number 15 Gloucester Gate within the Regent's Estate area of Regent's Park (Camden) Conservation Area (EUSo12);
 - number 58 Grafton Way within the Fitzroy Square Conservation Area (EUSo20); numbers 29-45 (and Connaught Hall) Tavistock Square; the war memorial at British Medical Association House, 1-9a Woburn Walk, 2-16 Dukes Road, the Senate House, Institute Education/Institute of Legal Studies Bedford Way, Philips Building School of Oriental and African Studies, Great Ormond Street Hospital Chapel, Church of St George the Martyr and Russell Hotel, Russell Square, are within the Bloomsbury Conservation Area (EUSo22);
 - numbers 1-9 Melton Street (EUSo30); Euston Fire Station (EUSo31);
 - Baker Street underground station in the Dorset Square Conservation Area (EUSo32); and
 - Lord's Cricket Ground Pavilion in the St John's Wood Conservation Area (EUSo39); and
- 172 Grade II listed buildings including :
 - 119-125 Parkway and the York and Albany public house in the Regent's Park Conservation Area (EUSo12);
 - the Edinburgh Castle public house (now called Edinboro' Castle), nos. 26-56 Mornington Terrace in the Camden Town Conservation Area (EUSo16); and
- four conservation areas: Regent's Park, Westminster (western half of the registered park and garden Regent's Park (EUSo02)); Fitzroy Square (EUSo20); Dorset Square (EUSo32); St John's Wood (EUSo41); and
- four London squares: Cartwright Gardens (EUSo22), Tavistock Square (EUSo22) and Gordon Square (EUSo22); and Oakley Square (EUSo16).

Non-designated assets

9.3.4

St James's Gardens, the site of an 18th to 19th century burial ground and the site of the adjacent Chapel of St James (EUSo40), non-designated assets of high value lie wholly within the land required, temporarily and permanently, for the construction of the revised scheme.

9.3.5 The following non-designated assets of moderate value lie wholly or partially within the land required, temporarily and permanently, for the construction of the revised scheme:

- 1 and 3 Cobourg Street, a late 19th century stables and post depot associated with Euston station (EUSo29);
- the former entrance to Euston underground station, corner of Melton Street and Drummond Street (EUSo27);
- Mornington Street Bridge, late 19th century railway bridge (associated with Grade II listed bridge piers (EUSo17));
- 1 Park Village East, a late 19th/early 20th century riding school (EUSo03);
- the National Temperance Hospital (EUSo43); and
- St James's Gardens (EUSo14).

9.3.6 The following identified non-designated assets of low value lie wholly or partially within the land required, temporarily and permanently, for the construction of the revised scheme:

- the find spot for a ring set with a Solidus possibly of Theodosius II of late Roman/early medieval date (EUSo10);
- Euston station, the site of a 19th century rail station and 1960s station concourse, platforms, parcels deck and power signal box, and the 1970s station forecourt buildings (EUSo05);
- Granby Terrace, late 19th/early 20th century Euston station carriage shed (EUSo38);
- Mornington Terrace, late 19th/early 20th century former carriage shed wall (part of group asset EUSo36);
- the 1900-6 railway cutting retaining wall between Euston station to Parkway (part of group asset EUSo36);
- the Thistle Hotel, Cardington Street, the former print works (EUSo44); and
- the LU lines and associated platforms and structures (for example Euston Square underground station and the Circle line (EUSo024).

9.3.7 All non-designated heritage assets within 250m of the land required, temporarily and permanently, for the construction of the revised scheme are listed in the gazetteer in the main ES Volume 5: Appendix CH-002-001 and Volume 5: SES2 and AP3 Appendix CH-002-001 and identified on Maps CH-01-001 to CH-01-004a in the SES2 and AP3 ES: Volume 5, Cultural Heritage Map Book. These include a number of assets with upstanding remains, the setting of which have been considered, for example:

- Euston House, 1930s purpose-built office (EUSo18);
- St Aloysius' Roman Catholic church and convent, Eversholt Street, 1960s church (EUSo18);

- Eversholt Street, 19th century terrace (EUS018); and
- Wellcome Trust, Research Institute, 183 Euston Road, 1930s Greco style office block. Part of a grouped asset of Greco style buildings located within and around Euston Square Gardens (EUS004).

Cultural heritage overview

- 9.3.8 The British Geological Society data show that Euston station and approach are located on a solid geology of London Clay. At the southern end of Euston station there are surface deposits of Lynch Hill Gravel which were deposited during the Wolstonian interglacial period. Further details of the geology of the area are contained in Section 11.
- 9.3.9 The topography around Euston station is generally flat, with a steady sloping incline from the station north towards Primrose Hill. The area is bisected south-west to north-east by Hampstead Road and Euston Road is oriented east-west to the front of Euston station.
- 9.3.10 Little of archaeological significance has been identified directly in the area of the revised scheme prior to the late post-medieval period. This may in part be due to the London Clay deposits being unsuitable for occupational activity, with much of the prehistoric and Roman activity being focused on the areas of gravel deposits further to the south (in Bloomsbury and the City of London) The extensive late post-medieval and modern urban development of the area may also have removed remains from these periods that may have been present.
- 9.3.11 A late Roman/early medieval ring set with a Solidus (coin) was recovered within the area of Euston station forecourt (EUS010). This however represents an isolated find and associated remains will have been extensively disturbed during the 19th/20th century development of the area.
- 9.3.12 A medieval settlement has been identified within the Euston study area at 'Totten Hall Court' (EUS011) to the west of Euston station by Hampstead Road and 'Rugmore' within the northern area of Regent's Park (EUS002). 'Totten Hall Court' represents the site of a medieval manor, which was located in a rural area several miles to the north of the medieval settlement cores of Westminster and London. 'Rugmore' was the potential site of a medieval hamlet which may have been removed by the creation of the Royal 'Marylebone Park' (EUS002) in the early post-medieval period.
- 9.3.13 Historically, the study area was used as agricultural land until the later 18th century. Following the construction of 'New Road' (Euston Road) in 1756, the area saw significant urban development spreading from Bloomsbury (EUS022) to the south. Built partially by the Duke of Bedford's estate, these developments were speculative buildings aimed at the middle classes with grand terraces and garden squares, for example, Tavistock Garden Square and Gordon Garden Square (EUS022).
- 9.3.14 The study area is located in an area of London that saw extensive development during the 18th and 19th centuries. Development was particularly associated with the early development of the railway, including the creation of the major railway terminus of Euston station (EUS005).

- 9.3.15 St James's burial ground (now known as St James's Gardens) was leased from Lord Southampton in 1789 and used as a burial ground until 1853 (EUSo14, EUSo40). The Chapel of St James was constructed adjacent to the burial ground in 1791. In 1886, the north-eastern portion of the burial ground was sold for the expansion of Euston station. Complete burials were removed in advance of the station construction works but partial remains may have survived until the redevelopment of the station in the 1960s. The land around the chapel was sold to The Temperance Movement for the site of a hospital in 1875. Parts of the late 19th century hospital survive to the north of the former chapel site. An additional wing (Insull Wing) was built in 1914 to the south of the chapel with a linking bridge to the Victorian buildings. The 1914 building was further extended in the 1930s. In the early 1960s, the Chapel of St James was demolished, although the burial vaults may survive beneath the hospital's modern car park (EUSo40).
- 9.3.16 The early 19th century saw the creation of John Nash's Regent's Park and Regent's Park estate (EUSo02, EUSo03 and EUSo12). Formerly 'Marylebone Park', a royal park with medieval origins, Regent's Park (EUSo02) was laid out according to plans set out by John Nash during the 1810s to 1830s. The development saw the creation of parkland with stucco villas and grand terraces arranged around the edges. The park and the grand terraces were designed as a coherent landscape, and were laid out to give the appearance of palatial mansions set in rural parkland. The villas on Park Village West and East (EUSo03, EUSo12), were designed by John Nash as idyllic rural villages, on the edge of the parkland. Despite subsequent small developments (including the construction of the London to Birmingham railway line) and World War II bomb damage, John Nash's rural landscape largely survives intact and has high heritage value.
- 9.3.17 Urban development intensified through the 19th century with the development of the Lord Southampton Estate, which included the construction of Mornington Crescent (EUSo16) and the creation of Somers Town (EUSo19).
- 9.3.18 Somers Town was planned as an upmarket development but by the late 19th century the estate had declined into slum housing and became a focus for late 19th century housing for railway workers. The area saw significant redevelopment in the 1920s and 1930s with slum clearance and the construction of large council apartment blocks.
- 9.3.19 Euston Square Gardens (grouped asset EUSo04) was created as part of the 19th century urbanisation and contains the Euston Lodges (Grade II) which were constructed in the same 'Greco' style as the Euston (Doric) Arch (formerly located within Euston station to the north (EUSo05)). An underpass connecting the east and west sides of Euston Square Gardens was constructed in the 19th century and was recorded on OS maps up until the 1960s. The underpass has since been closed and bricked up during landscaping in the late 20th century. The walls of the underpass are still visible within the gardens and are connected to the Euston Lodges. The square is surrounded by significant buildings which include the Grade II* (Greco style) 1- 9 Melton Street (EUSo30). Built in 1906-1908 as the headquarters of the London Edinburgh and Glasgow Assurance Company, it was the first purpose-built office building. The building was originally meant to be part of a larger scheme, designed by Arthur Beresford Pite, with a frontage on Euston Road. Pite, however, was not retained for the design of the shortened 1930s extension. Grade I early 19th century St

Pancras 'New' Church' (EUSo15) lies on the opposite side of Euston Road with its distinctive caryatids.

- 9.3.20 The 'Greco' style of Pite's 1-9 Melton Street and the St Pancras 'New' Church were continued around Euston Square with the construction of the Grade II Drayton House and the Wellcome Trust building, built during the inter-war period (part of grouped asset EUSo04). However, the style is not followed all around the square with the Art Deco Grade II* Euston Fire Station (EUSo31) and Richard Seifert 1970s 'International' style Euston forecourt towers and bus station (EUSo05). Euston Square Gardens also contains the Grade II* Euston war memorial (EUSo42), which was erected in 1921.
- 9.3.21 Constructed in 1837 for the London and Birmingham Railway Company, Euston station (EUSo05) is the second oldest major rail terminal in London. The station included the Euston Arch which was constructed as the station's Euston Street entrance (approximately where the ramp for platforms 8 and 9 is now). The station and associated rail cutting (EUSo36) was expanded during the late 19th century, including the construction of the Granby Terrace (EUSo38) and Mornington Terrace carriage sheds (EUSo36). Elements of the original 1830s cutting and tunnel survive in the form of the Grade II listed Parkway Tunnel (at the northern end of the station approach) and a section of adjoining cutting wall (EUSo37).
- 9.3.22 No further major development was undertaken on the railway infrastructure prior to World War II. Industry developed in the local area as a result of improved transport connections. An example of this is the print works (EUSo44) which is recorded to the north of St James's Gardens's. The print works was first recorded on the OS map of 1875. Cartographic evidence and the exterior of the surviving blocks indicate that there were multiple phases of development. The whole building was redeveloped as part of a hotel in the late twentieth century.
- 9.3.23 Euston station and streets between the old station and Euston Square including Euston Grove and Euston Circus were demolished to construct the current Euston station, parcel deck and power signal box in the 1960s, including the demolition of the Euston Arch. Offices and a bus station were added to the forecourt in the 1970s. A statue of Robert Stephenson (EUSo35), that was originally located within the Great Hall of the earlier Euston station, was retained but moved to the modern station forecourt. Only the lodges in Euston Square Gardens (EUSo04) survive in their original position from the earlier station.
- 9.3.24 World War II had a significant impact on the character of the area. Bomb damage led to clearance of large parts of the Euston area, in particular around Somers Town (EUSo19) and the area between Albany Street and Hampstead Road, where the cleared area was used to create the modern council-built Regent's Park Estate.

Future baseline

Construction (2017-2026)

- 9.3.25 The SES2 and AP3 ES: Volume 5 Appendix CT-004-000 provides details of the developments, additional to those identified in the main ES, which are assumed to have been implemented by 2017. None of the identified developments affect the assessment of the revised scheme's likely construction impacts on heritage assets.

Construction and operation (2026–2033)

9.3.26 No committed developments have been identified in this area that will materially alter the baseline conditions in 2026.

Operation (2033 onwards)

9.3.27 No committed developments have been identified in this area that will materially alter the baseline conditions in 2033.

9.4 Effects arising during Stage A Construction (2017-2026)

Avoidance and mitigation measures

9.4.1 The draft CoCP sets out the provisions that will be adopted to control effects on cultural heritage assets. The provisions include the following (see Volume 5 of the main ES: Appendix CT-003-000):

- management measures that will be implemented for assets that are to be retained within the land required for the construction of the revised scheme (CoCP, Section 8);
- the preparation of project wide principles, standards and techniques for works affecting heritage assets (CoCP, Section 8);
- the use of appropriate equipment and methods to limit ground disturbance and settlement followed by monitoring, protection and remediation (CoCP, Section 10);
- a programme of archaeological investigation and recording to be undertaken prior to/or during construction works affecting the assets (CoCP, Section 8); and
- a programme of historic building investigation and recording to be undertaken prior to modification or demolition of the assets (CoCP, Section 8).

9.4.2 The following measures have been incorporated into the design of the revised scheme to reduce impacts on assets:

- the design avoids the need for partial demolition of the Grade II* 1-9 Melton Street (EUS030), now occupied by the Royal College of General Practitioners;
- construction sites for the works to the retaining walls and tunnel portal have been located and designed to avoid physical impacts to listed buildings on Parkway (EUS012), Park Village East (EUS003) and some listed elements of Parkway Tunnel and cutting (EUS037);
- the replacement retaining walls, parapets and landscaping, which are to be designed to reflect the current setting of Park Village East (EUS012);
- permanent relocation of the following designated assets: Southampton monument and Christie monument in St James's Gardens (EUS014); the Robert Stephenson statue (EUS035) in Euston station forecourt; the war memorial (EUS042) and railings in Euston Square Gardens (EUS004); and the Mornington Street Bridge piers and lamp stands (EUS017); and

- installation of permanent ground anchors to provide stability to existing retaining walls that are to be kept and minimise ground movements relating to new walls proposed in the vicinity of assets in Park Village East (EUS003) and Mornington Bridge Street Piers (EUS017).

Assessment of impacts and effects

Temporary effects

- 9.4.3 The construction works, comprising excavations and earthworks and including temporary works such as construction compounds, storage areas, and diversion of existing roads and services, have the potential to affect heritage assets during the construction period. Impacts will occur to assets both within the land required for the construction of the revised scheme and assets in the wider study area due to the visibility of plant, cranes and equipment and other construction factors.
- 9.4.4 The Grade II* villas on Park Village East, which are located within the Regent's Park (Camden) Conservation Area (EUS003), are an asset of high value which lie within the land required to construct the revised scheme. The character and context of the asset and its setting in the wider conservation area will be impacted by construction activities associated with the demolition of the Park Village East railway retaining wall, construction of the West Side Retaining Wall (Cartmel), the reinstatement of Line X, construction of the high speed dive under north and high speed dive under south, the Mornington Terrace Sidings satellite compound, Mornington Street overbridge satellite compound and Park Village East (North) satellite compound. The temporary impact on setting will constitute a moderate impact and a major adverse significant effect.
- 9.4.5 To maintain the stability of Park Village East, permanent ground anchors will be inserted through both the existing and proposed retaining walls. These anchors will pass below a number of properties along Park Village East and the garden of 12 Park Village West to provide stability to the existing walls and reduce ground movements resulting from the Line X reinstatement and retaining wall replacement works. The parapet and landscape features will be restored on completion of the construction works. The temporary impact on setting will constitute a moderate impact and a major adverse significant effect.

Cumulative effects

- 9.4.6 It is not considered that there will be any cumulative effects from temporary impacts on heritage assets within the study area.

Permanent effects

- 9.4.7 Permanent significant effects can occur either as a result of physical impacts on heritage assets within the land required, temporarily or permanently, for construction of the revised scheme, or through changes to the setting of heritage assets through the presence of the revised scheme.
- 9.4.8 The Grade II listed buildings numbers 14-15 Melton Street (EUS027), assets of moderate value, will be demolished for the expansion and remodelling of Euston station. This will constitute a high impact and major adverse significant effect.

- 9.4.9 The partial demolition of Euston station, the demolition of the power signal box, One Euston Square and Grant Thornton House (assets of low value (EUS005)) for construction of the high speed station, will constitute a high impact and moderate adverse significant effect.
- 9.4.10 The 1 and 3 Cobourg Street former stables (EUS029), the former Euston underground station on Melton Street (EUS028) and Granby Terrace carriage shed (EUS038) and Mornington Street Bridge (EUS017), are assets of low value. They will be demolished in Stage A for construction of the high speed station and the station approach works and this will constitute a high impact and moderate adverse significant effect.
- 9.4.11 The Parkway Tunnel and cutting (EUS037) will be partially demolished. It is uncertain which existing elements of the tunnel are listed, however, the western wall of the original cutting (now the central retaining wall), which will be demolished, is considered to be curtilage to the listing. The tunnel and cutting is an asset of moderate value and the demolition will constitute a high impact and major adverse significant effect.
- 9.4.12 The Euston railway cutting retaining wall and parapet at Park Village East (EUS036) will be rebuilt in a different form and slightly set back from its current position. The asset is of low value. This will constitute a high impact and moderate adverse significant effect.
- 9.4.13 The Mornington Terrace retaining wall parapet (EUS036), an asset of low value, will be partially demolished as part of the Mornington Street Bridge works. The parapet will be rebuilt in its current location. This will constitute a high impact and moderate adverse significant effect.
- 9.4.14 The late 19th/early 20th century National Temperance Hospital (EUS043), an asset of moderate value, will be demolished for the construction of the National Temperance Hospital main compound. This will constitute a high impact and major adverse significant effect.
- 9.4.15 The Thistle Hotel, Cardington Street (EUS044), a former print works and asset of low value will be demolished as part of the enabling works, ahead of the construction of additional platforms at Euston station. The impact will constitute a high impact and a moderate adverse significant effect.
- 9.4.16 St James's Gardens burial ground and the site of the Chapel of St James located in the adjacent hospital car park (EUS040), assets of high value, will be removed for construction of the high speed station, temporary construction compounds and for the construction of new access roads. This will constitute a high impact and a major adverse significant effect.
- 9.4.17 The Grade II* 1-9 Melton Street (EUS030), an asset of high value will have its setting permanently impacted by the demolition of the adjoining 10 Melton Street, which will expose the building's northern wall and remove the architect's intended street line. The effect of the construction works will be to permanently alter the appearance and appreciation of the setting of the listed building. The building will be isolated from its intended streetscape and the exposure of the northern wall will permanently alter the appearance of the building. This will constitute a medium impact and a major adverse significant effect.

- 9.4.18 The Grade II* War Memorial in Euston Square Gardens (EUSo42) is an asset of high value. The asset will be removed for the duration of construction Stage A. This will constitute a high impact and a major adverse significant effect.
- 9.4.19 The London Square, Euston Square Gardens (EUSoo4) is an asset grouping of moderate value. It includes the Grade II pair of lodges in Euston Square Gardens and Grade II railings around Euston Square Gardens. The setting of these assets will be changed by the physical intrusion of the Euston Square Gardens east and west satellite construction compounds, the Euston Forecourt satellite construction compound and the Podium main construction compound. This will cause a visual impact and increased noise and disturbance associated with construction activities. The railings will also be partially removed during construction. This will constitute a high impact and a major adverse significant effect.
- 9.4.20 The Grade II Mornington Street Bridge piers and lamp stands, west and east ends (EUSo17) are of moderate value. The assets will be removed during the replacement of the Mornington Street Bridge and reinstated after replacement of the bridge. This will constitute a moderate impact and a moderate adverse significant effect.
- 9.4.21 The Grade II listed Southampton Monument and Christie Monument in St James's Gardens (EUSo14), assets of moderate value, will be removed during construction Stage A. The assets will be stored and then relocated. Although they will be relocated their intended setting will be altered upon reinstatement. This will permanently affect our ability to understand and appreciate the asset. This will constitute a medium adverse impact and moderate adverse significant effect.

Cumulative effects

- 9.4.22 The cultural heritage methodology includes the consideration of the inter-project effects of a number of technical topic assessments, for example, landscape and visual, ecology and water resources and flood risk. Consequently, these interactions have been included in the assessment of impacts and effects.
- 9.4.23 There are no inter-project effects on cultural heritage.

Other mitigation measures

- 9.4.24 Refinements to the mitigation measures incorporated into the design of the revised scheme or included in the draft CoCP will be considered during detailed design to reduce further the significant effects described above. These refinements will include the identification of locations where the physical impact on below ground assets can be reduced through design.

Summary of likely residual significant effects

- 9.4.25 A significant major adverse effect will arise from the permanent loss of St James's Gardens due to construction of the revised scheme. The gardens contain the post-medieval St James's burial ground and chapel. A programme of archaeological works will be prepared to investigate, analyse, report and archive these assets.
- 9.4.26 The revised scheme will result in a significant major adverse effect due to the permanent loss of the Grade II listed 14-15 Melton Street (EUSo27), the Grade II listed western side of the Parkway Tunnel (EUSo37), the non-designated former Euston underground station on Melton Street (EUSo28), the non-designated 1 and 3 Cobourg

Street former stables (EUSo29) and non-designated National Temperance Hospital (EUSo43).

- 9.4.27 The revised scheme will result in a significant moderate adverse effect due to the permanent loss of the non-designated Mornington Street bridge (EUSo17), the Euston railway cutting retaining wall and parapet at Park Village East (EUSo36), Granby Terrace carriage shed (EUSo38), the former print works (EUSo44) and the station power signal box, One Euston Square, Grant Thornton House and partial demolition of Euston station (EUSoo5). A programme of built heritage works will be prepared to investigate, analyse, report and archive these assets.
- 9.4.28 The revised scheme will alter the setting of several built heritage assets around Euston, including, temporarily, the Grade II* listed buildings in Park Village East (EUSoo3) during construction, and permanently, the Grade II* 1-9 Melton Street. A number of listed buildings including the Grade II* war memorial in Euston Square Gardens (EUSo42), the Grade II Southampton monument and Christie monument in St James's Gardens (EUSo14), and the Grade II Mornington Street bridge piers and lamp stands, west and east ends (EUSo17) will be relocated, significantly altering their setting.

9.5 Effects arising during Stage B1 construction and operation (2026–2033)

Avoidance and mitigation measures

- 9.5.1 The draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000) sets out the provisions that will be adopted to control effects on cultural heritage assets. The construction Stage A assessment (Section 9.4) provides the general avoidance and mitigation measures that are also relevant to Stage B1 construction and operation.

Construction

Assessment of impacts and effects

Temporary effects

- 9.5.2 The construction works, comprising excavations and earthworks and including temporary works such as construction compounds, storage areas, and diversion of existing roads and services, have the potential to affect heritage assets during the construction period. Impacts will occur to assets both within the land required for the construction of the revised scheme and assets in the wider study area due to the visibility of plant, cranes and equipment and other construction factors.
- 9.5.3 The Grade II* 1-9 Melton Street (EUSo30), an asset of high value will have its setting impacted by the site of the Euston Square Gardens (west) satellite compound, Melton Street satellite compound and the Cobourg Street satellite compound. This will give rise to a visual impact and increased noise and disturbance associated with construction activities. The temporary impact on setting will constitute a low impact and a moderate adverse significant effect.
- 9.5.4 The London Square Euston Square Gardens and Lodges in Euston Square Gardens (EUSoo4) comprise an asset of moderate value which is located within the land required to construct the revised scheme during construction Stage B1. Access to the asset will be impacted by the physical intrusion of the Euston Square Gardens (east

and west) satellite compounds. This will also give rise to visual impact and increased noise and disturbance associated with construction activities. The temporary impact to the asset and its setting will constitute a moderate impact and a moderate adverse significant effect to these assets.

Cumulative effects

- 9.5.5 There will be no cumulative effects from temporary impacts on heritage assets within the study area.

Permanent effects

- 9.5.6 Permanent significant effects can occur either as a result of physical impacts on heritage assets within the land required, temporarily or permanently, for construction of the revised scheme, and/or through changes to the setting of heritage assets through the presence of the revised scheme.
- 9.5.7 The Grade II* War Memorial in Euston Square Gardens and the associated lamp posts (EUSo42), an asset of high value, will be moved to the south and incorporated into Euston Square Gardens following the removal of the bus station access road and the reinstatement of Euston Square Gardens at the end of construction Stage B1. The location of the memorial, in the centre of the approach to the former Euston station, was intended to slow traffic and to force those approaching the station to view the memorial. This kind of position was common for war memorials and forms part of its setting and contributes to its value. The removal of the road and relocation of the memorial will permanently affect the intended setting, changing our ability to understand and appreciate the asset. This will constitute a low adverse impact and significant moderate adverse effect.
- 9.5.8 The London Square, Euston Square Gardens (EUSo04), is an asset of moderate value which is located within the land required to construct the revised scheme. The gardens will be reconfigured to change vehicular access to the bus station resulting in the removal of the approach road through the gardens. The Grade II listed railings, included in Euston Square Gardens, will be partially removed during construction and restored. There may also be an impact to the underpass, which is part of the curtilage of the Grade II listed Euston Lodges, in Euston Square Gardens, resulting from the potential need to alter the underpass and from the removal of the railings. The permanent impact is medium resulting in a significant moderate adverse effect.
- 9.5.9 There will be a further phase of partial demolition of the western part of the existing Euston station. This will constitute a high impact and moderate adverse significant effect.

Cumulative effects

- 9.5.10 There are no new or different likely significant cumulative effects for cultural heritage as a result of any changes acting in combination with one another, or as a result of any relevant committed development interacting with the revised scheme.

Other mitigation measures

- 9.5.11 Refinements to the mitigation measures incorporated into the design of the revised scheme or included in the draft CoCP will be considered during detailed design to reduce further the significant effects described above.

Summary of likely residual significant effects

- 9.5.12 The revised scheme will result in the further partial demolition of Euston station (EUS005), in construction Stage B1. A programme of built heritage works will be prepared to investigate, analyse, report and archive these assets.
- 9.5.13 There will be a permanent impact to Euston Square Gardens (EUS004) resulting from the bus station reconfiguration. This will add a new section of road to the north-west of this asset and remove the current central access road. The Grade II railings will be partly removed during construction and there will be an impact to the underpass associated with the Grade II Euston Lodges. This will constitute a medium impact resulting in a moderate adverse significant effect. A programme of heritage works will be prepared to investigate, analyse, report and archive the gardens and associated assets.
- 9.5.14 There will be a permanent impact to the setting of the Grade II* War Memorial and associated lamp posts (EUS042). This is a result of the permanent removal of the asset's intended setting resulting from the loss of the approach road through Euston Square Gardens. This will constitute a low adverse impact and a moderate adverse significant effect.

Operation

Avoidance and mitigation measures

- 9.5.15 No measures have been required to reduce the impacts and effects on assets.

Assessment of impacts and effects

- 9.5.16 The assessment considers the revised scheme once operational and all effects will be permanent. There will be no physical impacts on buried archaeological remains or other heritage assets arising from the operation of the revised scheme. Impacts on the setting of heritage assets arising from the physical presence of the revised scheme are described as permanent occurring within the construction phase and are not repeated in detail here, albeit that they will endure through the operation of the revised scheme. Where there is a combined effect on the setting of an asset from the presence of the revised scheme and its operation, this is reported in the assessment of operation.
- 9.5.17 No significant environmental effects will occur as a result of permanent changes to the setting of the heritage assets arising from the impacts of railway operation.

Cumulative effects

- 9.5.18 There are no new or different likely significant cumulative effects for cultural heritage as a result of any changes acting in combination with one another, or as a result of any relevant committed development interacting with the revised scheme.

Other mitigation measures

9.5.19 No additional mitigation measures are required.

Summary of likely residual significant effects

9.5.20 There will be no significant residual effects during Stage B1 operation.

9.6 Effects arising during operation (2033 onwards)

9.6.1 There will be no significant residual effects during operation.

10 Ecology

10.1 Introduction

10.1.1 This section describes the ecological baseline and identifies likely impacts and significant ecological effects that will arise from the construction and operation of the revised scheme. These include impacts on species, habitats and sites designated for their importance for nature conservation.

10.1.2 The principal ecological issues in this area are the loss of habitat in St James's Garden Site of Local Importance (SLI) and Regent's Park SMI.

10.1.3 Volume 5 of the main ES and Volume 5 of the SES2 and AP3 ES contain supporting information to the ecological assessment reported in this section, including:

- ecological baseline data (Volume 5 of the main ES: Appendices EC-001-001, EC-002-001, EC-003-001 and EC-004-001; and SES2 and AP3 ES Volume 5: Appendix EC-001-001); and
- a register of local/parish level effects which are not described in Volume 2 (Volume 5 of the main ES: Appendix EC-003-001; and SES2 and AP3 ES Volume 5: Appendix EC-003-001).

10.1.4 As well as survey data, the assessment draws on existing information gathered for the main ES from national organisations and from regional and local sources including: Greenspace Information for Greater London (GiGL); London Wildlife Trust; and London Bat Group.

10.2 Scope, assumptions and limitations

10.2.1 The assessment scope for ecology is as set out in Volume 1 of the main ES and Volume 1 of the SES2 and AP3 ES. The key assumptions and limitations, and the methodology for determining significance of effects are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000) and the SMR Addendum (Volume 5: Appendix CT-001-000) of the main ES. Limitations associated with particular surveys are reported in the main ES Volume 5: Appendices EC-001-001, EC-002-001, EC-003-001, and EC-004-001 and in Volume 5: SES2 and AP3 ES Appendix EC-001-001.

10.2.2 It should be noted that the baseline information provided in Section 10.3 does not include descriptions of designated sites, habitats and species associated with land above bored tunnel where no impacts on ecological receptors are anticipated.

- 10.2.3 The scheme design and urban location of the revised scheme and the absence or limited extent of suitable habitats means that some species and species groups have been scoped out of the assessment as the habitats that support them are not present (e.g. no natural rivers), or are considered inherently unsuitable for species of interest due to their man-made nature (e.g. concrete-walled canals). Within this area, these groups and species include amphibians, badger, dormouse, otter, water vole, aquatic invertebrates, fish, white-clawed crayfish). Further information is presented in Appendices EC-001-001, EC-002-001, EC-003-001, and EC-004-001 in Volume 5 of the main ES.
- 10.2.4 Access was not obtained to all of the land area where general habitat survey (Phase 1 habitat survey) was proposed. Partial Phase 1 habitat survey was carried out from footpaths used by the public for areas where access was not permitted. In addition, access could not be gained for survey of a number of buildings and trees. Further details are provided in Volume 5 of the main ES: Appendices EC-001-001, EC-002-001, EC-003-001, and EC-004-001 and Section 10.3; and in Volume 5 of the SES2 and AP3 ES Appendix EC-001-001.
- 10.2.5 Where data are limited, a precautionary baseline has been built up according to the guidance provided in Volume 5: Appendix CT-001-000/2 of the main ES. This constitutes a reasonable worst-case basis for the subsequent assessment.
- 10.2.6 The precautionary approach to the assessment that has been adopted is sufficient to identify the likely significant effects of the revised scheme.

10.3 Environmental baseline

Existing baseline

- 10.3.1 This section describes the ecological baseline relevant to the assessment: the designated sites, habitats and species recorded in this area. Further details are provided in the reports and maps presented in Volume 5 of the main ES (Appendices EC-001-001, EC-002-001, EC-003-001, and EC-004-001 and Map Series EC-01 to EC-12, Volume 5 Ecology Map Book CFA1) and Volume 5 of the SES2 and AP2 ES (Appendix EC-001-001 and Map Series EC-05 and EC-06). Statutory and non-statutory designated sites are shown on Map EC-01-001, Volume 5, Ecology Map Book CFA1 of the main ES.
- 10.3.2 Land required for the construction of the revised scheme and that adjacent to it consists of a predominantly built environment. The single largest area of green space⁶⁹ is Regent's Park SMI and there are further small areas in private gardens. Grassland and mature trees are present in St James's Garden SLI and mature trees are present in Euston Square Gardens. The Camley Street Nature Park Local Nature Reserve (LNR) is located to the north-east of the revised scheme. The revised scheme falls within an area designated in the London Plan as an Area of Urban Ecological Deficiency.

⁶⁹ Green spaces are areas of natural or semi-natural land, for example, parks, gardens and woodlands.

Designated Sites

- 10.3.3 There is one statutory designated site located within 500m of the land required for the construction of the revised scheme, namely Camley Street Nature Park LNR. This site provides natural habitat for bats, birds, butterflies, amphibians and plant life. It is approximately 470m north-east of the land required for the construction of the revised scheme.
- 10.3.4 There are two LWSs relevant to the assessment in this area. These are:
- Regent’s Park SMI – comprises mature parkland trees, a small enclosed woodland, an ornamental lake and a grassland area managed specifically for wildlife. Over 100 species of birds annually have been recorded within the site, and in addition a large number of invertebrates. The north-east corner of the SMI (which includes the coach park at ZSL London Zoo) is within the land required for the construction of the revised scheme and is of county/metropolitan value; and
 - St James's Garden SLI – contains a number of mature trees, ornamental shrubberies and two small grassland areas managed specifically for wildlife. The SLI is within the land required for the construction of the revised scheme and is of local/parish value.

Habitats

- 10.3.5 The following habitat types which occur in this area are relevant to the assessment.

Grassland

- 10.3.6 Amenity grassland is present at St James’s Garden SLI. The grassland has in small areas been left unmown as an urban wildlife enhancement. Grassland is a Camden Biodiversity Action Plan (BAP)⁷⁰ habitat. The grassland at St James’s Garden is of local/parish value.
- 10.3.7 Amenity grassland is also present at the ZSL London Zoo coach park which in small areas has been left unmown as an urban wildlife enhancement. However, due to shrub encroachment and limited species diversity, this area’s value as grassland habitat is limited. Grassland is a Camden BAP⁷¹ habitat. The grassland at ZSL London Zoo car park is of local/parish value.

Trees and ornamental planting

- 10.3.8 Mature and semi-mature trees including black poplar hybrids, London plane, beech, hawthorn, yew, alder, oak, birch, lime, rowan, sycamore, crab apple and horse chestnut are present at ZSL London Zoo. The trees in this area are considered to be of local/parish value.

⁷⁰ London Borough of Camden, *Camden Biodiversity Action Plan*, <http://camden.gov.uk/ccm/content/leisure/outdoor-camden/nature-in-camden/wildlife/introduction-to-the-camden-biodiversity-action-plan.en;jsessionid=6FC5EAFE94A929152DD96377CC9E5D6B> Accessed: September 2013.

⁷¹ London Borough of Camden, *Camden Biodiversity Action Plan*, <http://camden.gov.uk/ccm/content/leisure/outdoor-camden/nature-in-camden/wildlife/introduction-to-the-camden-biodiversity-action-plan.en;jsessionid=6FC5EAFE94A929152DD96377CC9E5D6B> Accessed: September 2013.

- 10.3.9 Urban trees, ornamental shrubbery, and flower beds are also present at various other locations in CFA1. They are commonly found in city squares, urban parks, and amenity plantings around buildings. This habitat complex is of local/parish value.

Buildings and structures

- 10.3.10 Buildings and structures may support very limited higher-plant vegetation, ferns, and mosses and lichens. Field survey shows railway brickwork in Camden does support around five common fern species, although few structures support more than a very small number of individual ferns, which limits their interest. Built environment is listed as a Camden BAP habitat. The buildings and structures are of local/parish value.
- 10.3.11 All other habitats are of local/parish value or below. Full descriptions are provided in Volume 5 of the main ES (Appendices EC-001-001, EC-002-001, EC-003-001, and EC-004-001).

Protected and/or notable species

- 10.3.12 A summary of the species relevant to the assessment is provided in Table 9.

Table 9: Protected and/or notable species

Species/species group	Value	Receptor	Baseline and rationale for valuation
Birds	Unlikely to be present	Black redstart.	Surveys undertaken since the completion of the main ES have confirmed that black redstart is likely to be absent from the area of the revised scheme.
	Up to district/borough	Breeding bird assemblages in Regent's Park.	Whilst no field survey was carried out at Regent's Park, the desk-study indicates that over 100 species of bird are recorded annually including one of London's largest breeding colonies of grey heron. Other species recorded (though not necessarily breeding) include a number of red listed species in the Birds of Conservation Concern (BoCC) ⁷² such as house sparrow, spotted flycatcher, and amber listed species in the BoCC such as reed bunting and kingfisher. In addition peregrine falcon and hobby were recorded. House sparrow is a species of principal importance ⁷³ and a London BAP ⁷⁴ species.
	Up to district/borough	Wintering bird assemblages in Regent's Park.	The desk-study indicated that Regent's Park is used by a number of wintering bird species including red listed species in the BoCC such as lapwing, and amber listed species in the BoCC such as firecrest, lesser redpoll and kingfisher.
	Local/parish	Breeding bird assemblage in St James's Gardens.	A total of 20 species were recorded at this small urban park; not all were breeding. Of local interest was grey wagtail, which probably breeds in or adjacent to the survey area. The remainder of the breeding bird assemblage comprised common and widespread species adapted to living in a built-up environment.

⁷² Eaton, M.A. et al. (2009). *Investigation Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man*. British Birds 102, pp.296-341.

⁷³ Natural Environment and Rural Communities Act 2006. Section 41: Species of Principal Importance in England.

⁷⁴ London Biodiversity Partnership, *London Biodiversity Action Plan*, <http://www.lbp.org.uk/londonpriority.html> Accessed: October 2013

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Species/species group	Value	Receptor	Baseline and rationale for valuation
Bats	Up to county/metropolitan	Bat assemblage associated with roosts within St James's Garden SLI, trees and buildings in the surrounding area.	<p>Field surveys in 2014 identified a bat roost in two bat boxes attached to a mature tree in a playground in the Regent's Park Estate near Stanhope Street. Fresh droppings (identified by DNA analysis as soprano pipistrelle droppings) were recorded in both boxes. The roost was considered likely to be a non-breeding summer or transitional roost for a small number of bats. The roost was unlikely to be a maternity colony based on the low numbers of fresh droppings recorded, which did not indicate prolonged use of the roost. No signs of bats were found in bat boxes on three other trees in the playground.</p> <p>Field surveys in 2015 identified two London plane trees with confirmed transient pipistrelle species roosts in St James's Garden, and one black poplar hybrid with a confirmed transient pipistrelle species roost in the west of the ZSL London Zoo proposed parking area.</p> <p>Field surveys in 2015 identified only two street trees with moderate potential to support roosting bats which were since downgraded to negligible due to the presence of rats in one tree and significant light pollution in the area.</p> <p>No roosts were recorded in buildings to be affected by the revised scheme; however a small number of buildings, which may support roosts, could not be viewed.</p> <p>Owing to the lack of access to carry out detailed survey at some sites it is not possible to rule out that some trees and buildings may potentially support maternity roosts of common bats such as pipistrelles or roosts of rarer bats, even in this urban environment. Therefore a precautionary value has been applied.</p>
	District/borough	Commuting and foraging common and rarer bat (noctule) assemblage associated with Gloucester Gate Bridge.	<p>Low levels of foraging and commuting activity were recorded at Gloucester Gate Bridge, including common and soprano pipistrelles, and single passes of noctule and brown long-eared bat.</p> <p>Soprano pipistrelle and brown long-eared bats are species of principal importance. All bats are London and Camden BAP species.</p>
Hedgehog	Local/parish	Resident population in Regent's Park.	The population has been studied by the Royal Parks Foundation ⁷⁵ . A combination of survey techniques identified 41 individual hedgehogs within the park, 11 of these within the ZSL car park area which was identified as a 'hotspot' of activity.
Terrestrial invertebrates	Negligible	Terrestrial invertebrate assemblage at St James's Gardens and railway land.	Desk-study and scoping surveys for invertebrates from PRoW identified only habitats of low quality for invertebrates; the invertebrate assemblage at these sites and in the Euston area overall will be of negligible conservation interest.

⁷⁵ A Study of Hedgehogs in The Regent's Park, London. Nigel Reeve, John Gurnell and Clare Bowen. Mammal News Summer 2015.

Future baseline

Construction (2017)

- 10.3.13 A summary of the known developments which are likely to be built and occupied prior to construction of the revised scheme is provided in SES2 and AP3 ES, Volume 5: Appendix CT-004-000. None of these developments will affect the character and value of the baseline ecological resources.

Construction and operation (2026-2033)

- 10.3.14 The review of future baseline conditions has not identified any additional committed developments, within the study area, which are likely have been completed by 2026.

Operation (2033 onwards)

- 10.3.15 No committed developments have been identified in this area that will materially alter the baseline conditions in 2033.

10.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

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

Assessment of impacts and effects

Designated sites

- 10.4.2 The construction of the high speed station will result in the permanent loss of the majority of St James's Garden SLI (approximately 1ha). This will have a permanent adverse effect on site integrity at the local/parish level, which is not significant.
- 10.4.3 An area of approximately 1.3ha is required for construction works associated with the partial use of the ZSL London Zoo car park as a lorry holding area and adjacent replacement parking, as well as works associated with utilities diversions. The total loss represents approximately 1% of the designated site and comprises mainly hard standing (0.9ha), grassland, eight mature trees and 13 semi-mature trees. This permanent loss of 1.3ha of habitat within the Regent's Park SMI will not result in a significant adverse effect on the integrity of the site.
- 10.4.4 No impacts will occur on the Camley Street Nature Park LNR.

Habitats

- 10.4.5 The construction of the high speed station will result in the permanent loss of 1ha of grassland and scattered trees in St James's Garden SLI. This will have a permanent adverse effect on the conservation status of each of these habitat types at the local/parish level. These effects are not significant.
- 10.4.6 The construction works for the replacement parking at ZSL London Zoo will result in the loss of approximately 0.2 ha of grassland. Whilst this will have a permanent adverse effect at the local/parish level, it is not significant.

- 10.4.7 The construction works will aim to retain as many mature trees as possible, but will result in the loss of eight mature and 13 semi-mature trees. This will have a permanent adverse effect on the conservation status of this habitat type at the local/parish level, which is not significant.
- 10.4.8 It is unlikely that any other effects on habitat receptors at more than the local/parish level will occur. Local/parish level impacts are listed in the main ES Volume 5: Appendix EC-006-005 and SES2 and AP3 ES Volume 5 Appendix EC-003-001.

Protected and/or notable species

- 10.4.9 A small summer or transitional soprano pipistrelle roost within two bat boxes attached to a tree in a playground near Stanhope Street will be lost as a result of the revised scheme. There are alternative roost sites in the area in the form of street trees and buildings, and the loss of this roost in isolation is unlikely to adversely affect conservation status of the bat populations concerned. However, a small number of buildings and trees with the potential to support bat roosts, and potentially maternity roosts, which will be demolished for construction of the high speed station, have not been accessible for survey. In addition, the revised scheme will result in the loss of some areas of suitable bat foraging habitat and transient pipistrelle roosts at St James's Gardens and Regent's Park. Following a precautionary assessment, these losses could have a permanent adverse effect on the local bat assemblage that will be significant at up to the county/metropolitan level.
- 10.4.10 Hedgehog (a UK priority species) is known to be present in Regent's Park including in the ZSL car park. In 2014, a study of the Regent's Park hedgehog population was led by the Royal Parks Foundation⁷⁶. A combination of survey techniques identified 41 individual hedgehogs within the park, 11 of these within the ZSL car park area which was identified as 'hotspot' of activity. The extension of the car park to the south will result in a loss of approximately 0.2 ha of foraging habitat, however mature trees and grassland along the southern edge of the car park will be retained and connectivity remains to other habitats within the car park and nearby within the park. There will be an increased risk of hedgehogs being hit by vehicles during the construction period, but this will be minimal given that the majority of construction work will be in the day time when hedgehogs are less active. No significant effect on the conservation status of the local hedgehog population is expected.
- 10.4.11 It is unlikely that any other effects on species at more than the local/parish level will occur. Local/parish level effects are listed in in the main ES Volume 5: Appendix EC-006-005 and SES2 and AP3 ES, Volume 5: Appendix EC-003-001.

Other mitigation measures

- 10.4.12 This section describes measures designed to reduce or compensate for significant ecological effects.
- 10.4.13 The replacement, reinstatement and improvements to open space included in the revised scheme will incorporate provision for planting and other ecological measures in compensation for losses of habitat. Mitigation measures that will be completed by the end of construction Stage A include: landscape enhancement of open space in the

⁷⁶ A Study of Hedgehogs in The Regent's Park, London. Nigel Reeve, John Gurnell and Clare Bowen. Mammal News Summer 2015.

Amphill Estate following utility works; landscaping in the open space north of Langdale; and landscaping at the northern end of Cobourg Street where open space will incorporate the remaining mature trees which were previously part of St James's Gardens.

- 10.4.14 The loss of any bat roosts in buildings and trees will be compensated for by the provision of alternative compensatory roosts in accordance with the principles of mitigation set out in the SMR Addendum (Main ES Volume 5: Appendix CT-001-000/2). Bat boxes will be installed in trees at Euston Square Gardens, or on other land within the revised scheme in the vicinity of Euston station. Following the implementation of the measures proposed, it is likely that any adverse effects on bats during the construction of the revised scheme will be reduced to a level where there will be no significant effects on the conservation status of the species concerned.
- 10.4.15 HS2 Ltd will work with the Royal Parks to develop a suitable strategy to reduce the potential for hedgehogs being struck by construction vehicles during the construction period.

Summary of likely residual significant effects

- 10.4.16 The mitigation, compensation and enhancement measures described will reduce the effects during construction Stage A to a level that is not significant.

10.5 Effects arising during Stage B1 construction and operation (2026–2033)

Construction

Avoidance and mitigation measures

- 10.5.1 By the end of construction Stage A (2026), the majority of landscaping of open space north of Langdale (on the Regent's Park Estate) and improvements to open space in the Amphill Estate are likely to have been completed.

Assessment of impacts and effects

- 10.5.2 Construction activity in Stage B1 will be restricted to areas with limited ecological value including: the further partial demolition of the existing station, construction of the second stage of the high speed station, works to create the basement service access ramp from Hampstead Road Bridge, construction of the taxi rank and open space on the deck between the high speed station and Hampstead Road Bridge and works between the station and Euston Road. The ecological effects of this have already been taken into account in the assessment of Stage A construction.

Other mitigation measures

- 10.5.3 At the conclusion of Stage B1, the replacement, reinstatement and improvements to open spaces will have been completed.
- 10.5.4 Compensation for the loss of St James's Gardens will include the creation of new and enhancement of existing green space. This will include areas of wildflower and native shrub planting at the proposed open space north of Langdale, in the Amphill Estate and the planting of wildflower grassland beneath trees in Euston Square Gardens and on the northern station entrance open space. Bird boxes will be included on some

trees in the landscaped areas. Trees planted as part of these compensation measures will include native species. These measures will mitigate the loss of the features for which the site is designated such that there will be no significant residual effects.

- 10.5.5 Compensation for the loss of part of Regent’s Park SMI and the grassland habitat and trees will include reinstatement of the habitats, ultimately to their former value through planting of appropriate species of tree and the creation of species-rich neutral grassland. Additional features for species will be provided in the areas of habitat creation and in surrounding retained trees where possible.

Summary of likely residual significant effects

- 10.5.6 There will be no new impacts (or residual effects) on ecological resources arising from Stage B1 construction.

Operation

Avoidance and mitigation measures

- 10.5.7 No measures have been included as part of the design of the revised scheme to avoid or reduce operational impacts on features of ecological value.

Assessment of impacts and effects

- 10.5.8 Collision risk for bats has been scoped out of the assessment in CFA1, because trains already operate at a similar speed along the conventional railway in the Euston Approach and it is unlikely that even with increased frequency, bats will be at greater risk of collision.
- 10.5.9 It will be unlikely that any other effects on ecological receptors will occur during operation.

Summary of likely residual significant effects

- 10.5.10 There will be no new impacts (or residual effects) on ecological resources arising during Stage B1 operation.

10.6 Effects arising during operation (2033 onwards)

Summary of likely residual significant effects

- 10.6.1 There will be no residual significant effects on ecological resources during operation from 2033.

11 Land quality

11.1 Introduction

- 11.1.1 This section presents the baseline conditions that exist for the revised scheme in relation to land quality and reports the likely impacts and any significant effects resulting from construction and operation of the revised scheme.
- 11.1.2 Consideration is given to land that may potentially contain contamination and land that has special geological significance, either from a scientific, mining or mineral

resources point of view. Mitigation measures are presented and any residual effects are summarised.

11.1.3 Areas of land with historical or current potentially contaminative uses have been identified that could affect, or be affected by, the construction of the revised scheme (for example any contaminated soils present may need to be removed or the construction may alter existing contamination pathways). Each of these areas has been studied to evaluate the scale of potential impacts caused by existing contaminants (if present) and what needs to be done to avoid significant consequences to people and the wider environment. In addition, a review has been undertaken to establish whether the operation of the revised scheme will lead to contamination of its surrounding environment and what needs to be done to prevent such contamination.

11.1.4 The key elements of the revised scheme in terms of land quality are:

- utilities diversions and the construction of foundations, and supporting structures to facilitate potential future OSD, some of which could penetrate the underlying Chalk Principal aquifer;
- a basement beneath the high speed platforms (which are 4m lower than the conventional platforms) which will be constructed to provide servicing and logistics for the high speed station and trains;
- widening of the existing railway retained cutting to the north of Euston station, to the west of the existing tracks. The high speed railway will enter into tunnel at the Euston portal about 100m south of Parkway. The high speed tracks will enter the proposed twin bore tunnel at a deeper level than the existing railway. This will require the reconstruction of retaining walls on the western side of the existing cutting; and
- improvements to Euston underground station. An additional ticket hall will be constructed at a lower level than the existing ticket hall with connections to the high speed platforms via the LU circulation area.

11.1.5 The main environmental features of this area include:

- large areas of residential land use; and
- groundwater quality within the Secondary A aquifers above (where present) and below the London Clay and within the Principal aquifer (Chalk Formation) at depth.

11.1.6 The main land quality issues relating to the revised scheme include:

- the presence of potentially contaminative activities associated with the long-standing railway land which includes sidings and maintenance facilities; and
- the presence of small pockets of former industry or other potentially contaminative activities (e.g. fuel stations) in the area required to construct the revised scheme.

11.1.7 Details of baseline information and the land quality assessment methodology are presented in the following appendices:

- SMR and the SMR addendum and appendices presented in Volume 5 (Appendices CT-001-000/1 and CT-001-000/2 of the main ES); and
- SES2 and AP3 ES: Volume 5 Appendix LQ-001-001: Land quality.

11.1.8 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 16. Issues regarding the disposal of waste materials including contaminated soils are addressed in Volume 3 of the main ES, Section 16.

11.1.9 Engagement has been undertaken with LBC Environmental Health Department and London Fire Brigade petroleum officer in relation to land contamination. This information is contained in Volume 5 of the main ES. There has been no further consultation undertaken for SES2 and AP3 ES. Information received to date has been included in the assessment.

11.2 Scope, assumptions and limitations

11.2.1 The assessment scope, key assumptions and limitations for the land quality assessment are set out in Volume 1 of the main ES and in the SMR and the SMR addendum and appendices presented in Volume 5 (Appendices CT-001-000/1 and CT-001-000/2 of the main ES). This section follows the standard assessment methodology.

11.2.2 Baseline data were reviewed for the area of land required to construct the revised scheme, excluding areas of utility works on the highway, together with a buffer extending out for a minimum of 250m, but in the case of groundwater data, up to 1km. This is defined as the study area.

11.2.3 Familiarisation visits to the study area were made in July 2012, where the location of the original scheme was viewed from points of public access only. Due to access constraints, not all sites considered to have the greatest potential for contamination were visited. However, the purpose of site visits was to verify desktop information and the lack of complete site walkovers is unlikely to have substantially affected the land quality assessment.

11.3 Environmental baseline

Existing baseline

11.3.1 Unless otherwise stated, all features described in this section are presented in Map LQ-001-001 (SES2 and AP3 ES, Volume 5, Land Quality Map Book).

Geology

11.3.2 This section describes the underlying ground conditions in the study area. It first describes any made ground present, followed by near surface superficial deposits and lastly describes the deeper bedrock geology. The geological mapping is illustrated on Map WR-02-001 (Main ES, Volume 5, Water Resources Map Book).

- 11.3.3 Made ground has not been indicated as present on the geological map⁷⁷. A cover of made ground is likely to be present throughout most of the study area due to previous cycles of development.
- 11.3.4 Superficial deposits are present to the south and west of Euston station comprising the Langley Silt Member and Lynch Hill Gravel. While the Lynch Hill Gravel just falls within the footprint of the proposed high speed station development, the Langley Silt Member is inferred to outcrop further north. The Lynch Hill Gravel is described by the British Geological Survey (BGS) as gravels with pockets of sands and clays.
- 11.3.5 Langley Silt is described as silts and clays, varying from yellow to brown.
- 11.3.6 Superficial deposits are indicated as being absent from the remainder of the study area.
- 11.3.7 The near-surface bedrock geology underlying the entirety of the study area is the London Clay Formation of the Thames Group. Typically this is a stiff grey and weathering to brown clay with thin beds of sand and pebbles at the base.
- 11.3.8 The geological succession beneath the London Clay generally comprises the following:
- the Harwich Formation, a thin sandy deposit (potentially only very localised);
 - the Lambeth Group (also termed the Woolwich and Reading Formations) which comprises a mixture of clay, sand and occasional pebble beds;
 - the Thanet Sand Formation, a dense green sand; and
 - the Chalk Group, which is a soft white limestone.
- 11.3.9 At the northern end of the station approach, the route will enter into tunnel, which will be confined within the London Clay Formation.

Groundwater

- 11.3.10 The Lynch Hill Gravel is classified by the Environment Agency as a Secondary A aquifer, but is of low value due to its limited extent and potentially poor water quality. The Langley Silt Member is classified as unproductive strata.
- 11.3.11 The London Clay is classified as an 'unproductive strata' (i.e. it is not considered to represent a usable groundwater resource). The Lambeth Group and Thanet Sand Formation are classified as Secondary A aquifers whilst the Chalk Group is classified as a Principal aquifer.
- 11.3.12 The Environment Agency reports that there are five private licensed groundwater abstractions from the underlying Chalk within the study area. No unlicensed groundwater abstractions have been identified from the data available.
- 11.3.13 The Environment Agency reports that there is a PWS with a source protection zone (SPZ) in this study area, approximately 840m west of the route (refer to SES2 and AP3

⁷⁷ Geological Survey of Great Britain (2006), *North London, Sheet 256, Solid and Drift Edition*, 1:50,000 series, Ordnance Survey, Southampton.

ES: Volume 5 Appendix WR-002-001, Water Resources Map Book for the location of the SPZ).

- 11.3.14 Further detail on the groundwater beneath the revised scheme can be found in Section 16.

Surface waters

- 11.3.15 The route does not cross any watercourses within the area, which is located within the Thames River Basin District (RBD) and is covered by the river basin management plan (RBMP)^{78 79}.
- 11.3.16 Although more than 500m from the route, the revised scheme includes utility works in the vicinity of the Regent's Canal (lower section), which is the section of the canal below Kentish Town Lock at Camden.
- 11.3.17 There are no licensed surface water abstractions in the study area.
- 11.3.18 Further information on surface water is provided in Section 16 of this report.

Current and historical land use

- 11.3.19 The study area is dominated by the existing Euston station, associated maintenance and works areas, a railway shed and multiple railway lines, much of which is in an existing retained cutting. From observation, the railway areas to the north of the station contain electrical switchgear equipment and parts are used for the storage of potentially contaminative liquids.
- 11.3.20 To the west of the existing station, within the footprint of the proposed station, the area comprises housing, educational buildings, hotels and commercial premises including a photographic equipment supplier and a disused petrol filling station.
- 11.3.21 Historical potentially contaminative land uses, other than the existing railway land, included:
- a builder's yard, printing works, electrical substation and garages within the proposed western extension of Euston station;
 - warehouses; engineering works; foundries; chemical works; printing works; and industrial laundry facilities to the west of the proposed western extension;
 - a leather works and garage to the east of Euston station; and
 - a tobacco works, timber yard, sawmill, fibrous plaster works and glass works towards the north of the study area.
- 11.3.22 Sites (both historical and current) identified by the review as posing a potential contaminative risk when the revised scheme is constructed are (listed from east to west):
- railway land in the location of the proposed station development, route

⁷⁸ Environment Agency (2009) *River Basin Management Plan*, Thames River Basin District.

⁷⁹ The Environment Agency's Digital Rivers Network (DRN) indicates a culverted watercourse at a minimum distance of 500m east of the route at Euston. The reach has been included in the DRN to ensure connectivity between Highgate Ponds and the Thames within the DRN. It is considered that the watercourse is a part of the sewer network and is not a surface water feature. It has therefore not been included in this assessment.

alignment and tunnel portal (Map LQ-01-001, B6 to D6, Volume 5: of the main ES, Land Quality Map Book);

- former leather works and current depot located to the east of Euston station (Map LQ-01-001, D5);
- former wagon works, sawmill, printing works, warehouses, chemical works, foundry and electricity substation located to the south-west of Euston station (Map LQ-01-001, D6 to D7);
- multiple former printing works abutting the north of St James's Gardens and a building yard (Map LQ-01-001, C76);
- former chemical works, foundry and printing works located to the west of Hampstead Road (Map LQ-01-001, C7);
- disused fuel filling station at 142 Hampstead Road (Map LQ-01-001, C6); and
- timber yard located west of the railway cutting adjacent to Regent's Park Barracks (Map LQ-01-001, B6).

11.3.23 Contaminants commonly associated with these uses could include metals, semi-metals, asbestos, organic and inorganic compounds.

Other regulatory data

11.3.24 Regulatory data reviewed include pollution incidents, radioactive and hazardous substances consents and environmental permits (previously landfill, integrated pollution control and integrated pollution prevention and control licences). The only notable entry relates to the disused fuel station at 142 Hampstead Road (Map LQ-01-001, C6, Volume 5 of the main ES, Land Quality Map Book).

11.3.25 Other entries in the study area are further afield and relate to fuel stations and radioactive substance consents associated with hospitals in the study area.

Mining and mineral areas

11.3.26 There are no active mining or mineral sites or minerals safeguarding areas within the study area.

11.3.27 No future areas of mining or mineral extraction are known.

Geo-conservation sites

11.3.28 Inspection of SPG issued by the London Geodiversity Partnership indicates that there are no current or potential geological designations (e.g. regionally important geological and geomorphological sites, locally important geological and geomorphological sites or Geological Site of Special Scientific Interest) within the study area⁸⁰.

⁸⁰ Green Infrastructure and Open Environments (2012), *London's Foundations: Protecting the geodiversity of the Capital*. Supplementary planning guidance, BGS/Natural England.

Receptors

- 11.3.29 The sensitive receptors that have been identified within this study area are summarised in Table 10.

Table 10: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents.	High
		Workers.	Moderate
		Station users.	High
	Controlled waters	Secondary A aquifer in Lynch Hill Gravel deposits.	Moderate
		Secondary A aquifer in Lambeth Group/Thanet Sand Formation located beneath the London Clay.	Moderate
		Principal aquifer in the Chalk.	High
	Built environment	Buildings and property.	Low to high
		Underground structures and services.	Low

Future baseline

- 11.3.30 As part of the assessment of potential future baselines, a search was undertaken of all relevant planning permissions within the study, which are provided in Volume 5: SES2 and AP3 ES Appendix CT-004-000.
- 11.3.31 Although some planning permissions were identified, which are likely to be developed, it is unlikely that any will materially alter the future baseline conditions during the period 2017 – 2033 onwards.

Construction (2017–2026)

- 11.3.32 No committed developments have been identified that will materially alter the baseline conditions during the period 2017-2026.

Construction and operation (2026–2033)

- 11.3.33 No committed developments have been identified that will materially alter the baseline conditions during the period 2026-2033.

Operation (2033 onwards)

- 11.3.34 No committed developments have been identified in this area that will materially alter the baseline conditions from 2033.

11.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 11.4.1 The construction assessment takes into account the mitigation measures contained within the draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000). The draft CoCP sets out the measures and standards of work that will be applied to the construction of the revised scheme. Its requirements in relation to work in contaminated areas will ensure the effective management and control of the work. Such requirements include:
- methods to control noise, waste, dust, odour, gases and vapours (draft CoCP, Sections 5, 7, 13 and 15);
 - methods to control spillage and prevent contamination of adjacent areas (draft CoCP, Section 5);
 - the management of human health exposure, for both construction workers and people living and working nearby (draft CoCP, Section 11);
 - methods for the storage and handling of excavated materials (both contaminated and uncontaminated) (draft CoCP, Sections 7 and 15);
 - management of any unexpected contamination found during construction (draft CoCP, Section 11);
 - a post-remediation permit to work system (draft CoCP, Section 11);
 - storage requirements for hazardous substances such as oil (draft CoCP, Section 16);
 - traffic management to ensure that there is a network of designated haul roads to minimise compaction/degradation of soils (draft CoCP, Section 7); and
 - methods to monitor and manage flood risk, and other risks from extreme weather events which may affect land quality during construction (draft CoCP, Section 16).
- 11.4.2 The draft CoCP requires that prior to and during construction a programme of further investigations, which may include both desk-based and site-based work, will take place in order to confirm the full extent of areas of contamination. A risk assessment will also be undertaken to determine what, if any, site specific remediation measures will be required to allow the revised scheme to be constructed safely and to prevent harmful future migration of contaminants (draft CoCP, Section 11). The investigation and assessment of potentially contaminated sites will be undertaken generally in accordance with:
- Environment Agency CLR11 'Model Procedures for the Management of Land Contamination' (2004)⁸¹; and
 - British Standard BS10175 'Investigation of Potentially Contaminated Sites' (2011)⁸².

⁸¹ Environment Agency (2004), *CLR11 Model Procedures for the Management of Land Contamination*.

- 11.4.3 Where significant contamination is encountered, a remedial options appraisal will be undertaken to define the most appropriate remediation techniques. This appraisal will be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with Sustainable Remediation Forum UK 'A Framework for Assessing the Sustainability of Soil and Groundwater Remediation' (2010)⁸³. The preferred option will then be developed into a remediation strategy, and the regulatory authorities will be consulted prior to implementation.
- 11.4.4 Contaminated soils excavated from the site, wherever feasible, will be treated as necessary to remove or render any contamination inactive, and reused within the revised scheme where needed and suitable for use. Treatment techniques are likely to include stabilisation methods, soil washing and bio-remediation to remove oil contaminants. Contaminated soil disposed of off-site will be taken to a soil treatment facility, another construction site (for treatment, as necessary, and reuse) or to an appropriately permitted landfill site. Given the constraints relating to the confined construction area around Euston, it is likely that remediation and treatment will be undertaken outside this particular study area.

Assessment of impacts and effects

- 11.4.5 Construction during Stage A will commence in 2017, with some early enabling works proposed for 2016. The works comprising the station approach and the first part of the high speed station (six platforms and the western side of the high speed station) will be undertaken during construction Stage A and therefore completed by the end of 2026.
- 11.4.6 To the north of the station, the existing railway cutting will be widened as far north as Granby Terrace Bridge to accommodate the high speed railway. The retained cutting will also be excavated to a greater depth than the existing cutting to allow the high speed railway to enter tunnel south of Parkway.
- 11.4.7 The revised scheme will also include construction of new retaining walls and large-scale below ground works to create a basement beneath the high speed station. The construction of new or replacement retaining walls beneath the station and in the station approach are expected to be formed by either contiguous bored pile retaining walls or barrette walls.
- 11.4.8 The revised scheme will also include measures to ensure the stability of the high speed railway dive under located underneath the existing railway approach (north of Mornington Street bridge) alongside the Line X reinstatement. This is expected to include permanent ground anchors and some ground treatment.
- 11.4.9 The piles supporting the areas of potential future OSD and providing mitigation against uplift forces for the basement station structures are expected to extend into the Thanet Sand Formation or Chalk.

⁸² British Standards Institution (2011), BS 10175:2011, Code of practice for investigation of potentially contaminated sites.

⁸³ Sustainable Remediation Forum UK (2010), A Framework for Assessing the Sustainability of Soil and Groundwater Remediation.

11.4.10 Support of the high speed concourses and platforms will include deep piles to support the top slab. The piles will also be designed to support potential future OSD and are likely to extend into the Chalk beneath the site.

Land contamination

11.4.11 An initial screening process was undertaken (identified in the methodology as Stages A and B) to identify areas of current or historical potentially contaminative use and consider which of these areas might pose contaminative risks for the revised scheme. In total, 44 areas were considered during this screening process, and of these, 21 areas were taken forward to more detailed risk assessments (Stages C and D), in which the potential risks were assessed more fully.

11.4.12 All areas assessed are shown on Map LQ-01-001 (Volume 5 of the main ES, Land Quality Map Book) and those considered as potentially posing a risk to the revised scheme are labelled with a reference number.

11.4.13 Conceptual site models (CSM) have been produced for the 21 sites in this area taken to Stage C and D assessments. The detailed CSM are provided in Volume 5 of the SES2 and AP3ES (Appendix LQ-001, 001, Section 3) and the results of the baseline risk assessments are summarised in this section. Potentially contaminated sites have been grouped, and considered together, where appropriate. The following factors have determined the need for a stage C and D assessment:

- whether the site is directly affected by the revised scheme;
- the vertical route alignment, i.e. whether the railway is in cutting at the site’s location;
- the presence of underlying Principal or Secondary A aquifers or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors.

11.4.14 A summary of the baseline CSM for the revised scheme is provided in Table 11. The impacts and baseline risks quoted are before any mitigation is applied.

11.4.15 The assessed baseline risk is based on the information provided at the time of assessment. Where limited information is available, it is based on precautionary, worst-case assumptions and may therefore report a higher risk than that which actually exists.

Table 11: Summary of baseline CSM for sites which may pose a contaminative risk for the revised scheme (construction Stage A)

Area reference ⁸⁴	Area name and classification	Main potential impacts	Main baseline risk ⁸⁵
1-14, 1-33		Potential impact on human health on-site from contamination by direct	Moderate/low

⁸⁴ Each area is assigned a unique identification number (see Volume 5: SES2 and AP3 ES Appendix LQ-001-001).

⁸⁵ 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.

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Area reference ⁸⁴	Area name and classification	Main potential impacts	Main baseline risk ⁸⁵
	<p>Existing on-site railway land and former wagon works overlying the London Clay Formation.</p> <p>(Map LQ-01-001, C6 and D6).</p>	<p>contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters.</p> <p>Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer).</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer).</p>	<p>Moderate/low</p> <p>Very low</p> <p>Low</p>
<p>1-40, 1-08, 1-07, 1-35, 1-44, 1-04, 1-30, 1-11</p>	<p>Former on-site printing works, chemical works and other previous contaminative land uses overlying London Clay.</p> <p>(Map LQ-01-001, B6, C6 and D6).</p>	<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.</p> <p>Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer).</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer).*</p>	<p>Low to moderate/low</p> <p>Very low to low</p> <p>Very low</p> <p>Low</p>
<p>1-27, 1-24</p>	<p>Former on-site printing works and warehouse overlying a Secondary A (superficial) aquifer.</p> <p>(Map LQ-01-001, D7).</p>	<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.</p>	<p>Low</p>

Area reference ⁸⁴	Area name and classification	Main potential impacts	Main baseline risk ⁸⁵
		Potential impact to groundwater within the Secondary A superficial aquifer.	Low
		Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer).	Very low
		Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer).*	Low
1-05, 1-29, 1-25, 1-26, 1-32, 1-38, 1-01, 1-39, 1-20	Former off-site printing works, chemical works and other previous contaminative land uses. (Map LQ-01-001, C7, D5 and D7).	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
		Potential impact on human health off-site from contamination by inhalation of migrating ground-gas and volatile vapours from contaminated soil/water.	Very low to low
		Potential impact to groundwater within the Secondary A superficial aquifer (refers only to polygons 1-29, 1-25, 1-26, Map LQ-01-001, D7).	Low

* This pollutant linkage only exists in polygons 1-07, 1-08, 1-27 and 1-40 which are within the footprint of the high speed station retaining wall.

Temporary effects

- 11.4.16 An assessment of the effects of contamination has been undertaken by comparing the CSM developed for potential contaminated land sites at baseline, construction and post construction stages. In order to assess effects at the construction stage, the baseline and construction CSM have been compared.
- 11.4.17 Table 12 presents a summary of the construction effects obtained from a comparison of the baseline and construction impacts relating to the revised scheme. The construction risk assessment takes into account the implementation of the mitigation measures set out within the draft CoCP. Further details of the construction effects are presented in the SES2 and AP3 ES: Volume 5 Appendix LQ-001-001.

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Table 12: Summary of temporary (construction) effects (construction Stage A)

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
1-14, 1-33	Existing on-site railway land and former wagon works overlying the London Clay Formation (Map LQ-001-01, C6 and D6),	<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 to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through retaining wall construction through the London Clay Formation: very low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.</p>	<p>N/A – receptor not present</p> <p>N/A – receptor not present</p> <p>Very low</p> <p>Low</p>	Negligible (not significant)
1-40, 1-08, 1-07, 1-11, 1-35, 1-44, 1-04, 1-30	Former on-site printing works, chemical works and other previous contaminative land uses overlying London Clay. (Map LQ-01-001 C6).	<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 on-site humans to contamination by inhalation of volatile vapours from contaminated soil/water: very low to low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: very low.</p>	<p>N/A – receptor not present</p> <p>Very low to low</p> <p>Very low</p>	Negligible (not significant)
		Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.*	Low	Negligible (not significant)

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Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
1-27, 1-24	Former on-site printing works and warehouse overlying a Secondary A (superficial) aquifer. (Map LQ-001-01, D7)	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. Impact from leaching of contaminants from soil to groundwater Secondary A superficial aquifers: low. Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: very low. Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.*	N/A – receptor not present Low Very low Low	Negligible (not significant) Negligible (not significant)
1-05, 1-29, 1-25, 1-26, 1-32, 1-38, 1-01, 1-39, 1-20	Former off-site printing works, chemical works and other previous contaminative land uses. (Map LQ-001-01, C7, D5 and D7)	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. Potential impact on human health of-site humans to contamination by inhalation of volatile vapours from contaminated soil/water: very low to low. Impact from leaching of contaminants from soil to groundwater Secondary A Aquifers (Refers only to polygons 1-29, 1-25, 1-26, Map LQ-001-01, D7): Low.	Low to mod/low Very low to low Low	Negligible (not significant)

* This pollutant linkage only refers to polygons 1-07, 1-08, 1-27 and 1-40

- 11.4.20 The baseline and construction CSM have been compared to determine the change in level of risk to receptors during the construction stage, and thus to define the level of effects at the construction stage. Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible even if the risk will remain as high. This will be the case where the construction of the revised scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.
- 11.4.21 Table 12 indicates that during construction activities there will be an overall negligible effect on identified receptors which is not significant.
- 11.4.22 The main potential risks identified are associated with on-site human health where any contaminants arising from current and/or historical potentially contaminative

activities are affected by the revised scheme. The measures set out in the draft CoCP will ensure that risks to human health (including residents, members of the public or employees of businesses) will not be increased over baseline conditions, and in some instances may improve during construction as any remediation is progressed.

- 11.4.23 Risks to groundwater quality in the lower aquifers from piling works will be managed in accordance with the draft CoCP (refer to Volume 5 of the main ES: Appendix CT-003-000) and good practice, including the Environment Agency guidance on piling and penetrative ground improvement. It is therefore likely that there will be a negligible effect on the groundwater quality within the lower aquifer during construction⁸⁶.
- 11.4.24 Construction site compounds located in this study area will include staff welfare facilities, maintenance facilities for plant and machinery and fuel storage in bunded tanks. Construction compounds will store and use potentially contaminative materials such as fuels, oils and solvents, and the measures outlined in the draft CoCP will manage risks from the storage of such materials.
- 11.4.25 It is unlikely that additional remediation works will be required over and above the mitigation measures contained as standard in the draft CoCP.
- 11.4.26 There will be no significant cumulative temporary effects from construction.

Permanent effects

- 11.4.27 Baseline and post-construction CSM have been compared to assess the permanent (post-construction) effects. The post-construction CSM assumes that all the required remediation has been carried out and validated.
- 11.4.28 Table 13 includes the summary of the permanent (post-construction) effects obtained from a comparison of the baseline and post-construction impacts, and whether these are significant or not. The details of these comparisons are presented in the SES2 and AP3 ES: Volume 5 Appendix LQ-001-001.

⁸⁶ Environment Agency (2001), *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*. National Groundwater & Contaminated Land Centre, Project NC/99/73. Solihull.

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Table 13: Summary of permanent (post-construction) effects (construction Stage A)

Area reference	Area name	Main baseline risk	Main post-construction risk	Post-construction effect and significance
1-14, 1-33	Existing on-site railway land overlying the London Clay Formation (Map LQ-001-01, C6 and D6).	<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 to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: very low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.</p>	<p>Low</p> <p>Moderate/low</p> <p>Very low</p> <p>Low</p>	Negligible to minor beneficial (not significant)
1-40, 1-08, 1-07, 1-11, 1-35, 1-44, 1-04, 1-30	Former on-site printing works, chemical works and other previous potentially contaminative land uses overlying London Clay. (Map LQ-01-001 C6).	<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 contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust: very low to low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the</p>	<p>Mod/low to very low</p> <p>Very low</p> <p>Very low</p>	Negligible to moderate beneficial (significant)

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Area reference	Area name	Main baseline risk	Main post-construction risk	Post-construction effect and significance
		London Clay Formation: very low.		
		Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.*	Low	Negligible (not significant)
<p>1-27, 1-24</p> <p>Former on-site printing works and warehouse overlying a Secondary A aquifer.</p>	<p>Former on-site printing works and warehouse overlying a Secondary A (superficial) aquifer.</p> <p>(Map LQ-001-01, D7)</p>	<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.</p> <p>Impact from leaching of contaminants from soil to groundwater Secondary A superficial aquifers: low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: very low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.*</p>	<p>Very low</p> <p>Very low</p> <p>Very low</p> <p>Low</p>	<p>Negligible to minor beneficial (not significant)</p> <p>Negligible (not significant)</p>
<p>1-05, 1-29, 1-25, 1-26, 1-32, 1-38, 1-01, 1-39, 1-20</p> <p>Former off-site printing works, chemical works and other previous</p>	<p>Former off-site printing works, chemical works and other previous contaminative land uses.</p>	<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>Moderate/low</p>	<p>Negligible (not significant)</p>

Area reference	Area name	Main baseline risk	Main post-construction risk	Post-construction effect and significance
contaminative land uses. (Map LQ-001-01)	(Map LQ-01-001, C7, D5 and D7)	<p>Potential impact on human health of-site humans to contamination by inhalation of volatile vapours from contaminated soil/water: very low to low.</p> <p>Impact from leaching of contaminants from soil to groundwater Secondary A aquifers (refers only to polygons 1-29, 1-25, 1-26, Map LQ-01-001, D7): low.</p>	<p>Very low to low</p> <p>Low</p>	

* This pollutant linkage only refers to polygons 1-07, 1-08, 1-27 and 1-40

- 11.4.29 In Table 13, the magnitude of the permanent effects and their significance has been determined by calculating the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance of the effect will be negligible even if the risk will remain high. This will be the case where the construction of the revised scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.
- 11.4.30 Table 13 indicates that, following any remediation which may be undertaken subject to the results of ground investigations, there will be an overall negligible to moderate beneficial effect on the areas of land identified as posing a contaminative risk within the area required to build the revised scheme.
- 11.4.31 Depending on the type of remediation undertaken, the beneficial effect recorded for certain sites is most likely to arise from the removal of contamination sources and direct contact, or dust pathways, by the construction of new hard surfaces (for example on the construction sites) and from the new station buildings or trackbed materials (in the operational part of the revised scheme).
- 11.4.32 There will be a negligible effect on all sites identified as posing a contaminative risk that are located outside of the area required to build the revised scheme.

Mining/mineral sites

- 11.4.33 There are no mining or mineral sites present within this study area.

Geo-conservation sites

- 11.4.34 There are no geo-conservation sites located within this study area.

Other mitigation measures

- 11.4.35 No additional mitigation measures are considered necessary to mitigate risks from land contamination during construction of the revised scheme beyond those set out in the draft CoCP of the main ES.

Summary of likely residual significant effects

- 11.4.36 With the application of the mitigation measures detailed above, there are likely to be no significant adverse residual effects. There are likely to be significant beneficial residual effects associated with the construction and any remediation which maybe undertaken of pockets of former industrial land within the footprint of the revised scheme.

11.5 Effects arising during Stage B1 construction and operation (2026–2033)

- 11.5.1 Users of the revised scheme (i.e. rail passengers), whilst within trains, are at all routine times within a controlled environment, and have therefore been scoped out of the assessment.

Avoidance and mitigation measures

Construction

- 11.5.2 The construction assessment for Stage B1 takes into account the mitigation measures contained within the draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000) which are the same as the mitigation measures described for construction Stage A, as set out in section 11.4.

Operation

- 11.5.3 Maintenance and operation of the revised scheme will be in accordance with environmental legislation and good practice, where appropriate spillage and pollution response procedures will be established.

Assessment of impacts and effects

Construction

- 11.5.4 During Stage B1, construction will include additional new LU infrastructure, excavation and completion of the high speed station service basement and spine building, and excavation and construction of the remaining five high speed platforms.
- 11.5.5 Retaining walls beneath the high speed station will provide foundation support to the new high speed station buildings and roof and form the primary structure for the LU ticket halls, passageways and underground station roof.
- 11.5.6 Where construction involves the installation of deep foundations such as tension piles and barrettes, some of these will extend down into the Thanet Sand Formation and potentially down into the Chalk.
- 11.5.7 The foundations for retaining walls, basement and new LU station structures associated with construction of the high speed station have been assessed as part of the land quality risk assessment.

Land contamination

- 11.5.8 An initial screening process was undertaken (identified in the SMR methodology as Stages A and B) to identify areas of current or historical potentially contaminative land use within the study area and consider which of these areas might pose

contaminative risks for the revised scheme. During Stage B₁, the proposed area to be developed decreases in extent, with construction predominantly taking place in proximity to the existing conventional station building west of Platform 13. Of the 44 areas that were considered during the original screening process, 19 areas have been taken forward to more detailed risk assessments (Stages C and D), in which the potential risks were assessed more fully.

- 11.5.9 All areas assessed are shown on Map LQ-01-001 (Volume 5, Land Quality Map Book of the main ES) and those considered as potentially posing a risk to the revised scheme are labelled with a reference number.
- 11.5.10 CSM have been produced for the 19 sites in this area taken to Stage C and D assessments. The detailed CSM are provided in SES2 and AP3 ES: Volume 5 (Appendix LQ-001-001, Section 3) and the results of the baseline risk assessments are summarised in this section. Potentially contaminated sites have been grouped, and considered together, where appropriate. The following factors have determined the need for a stage C and D assessment:
- whether the site is directly affected by the revised scheme;
 - the vertical route alignment, i.e. whether the railway is in cutting at the site's location;
 - the presence of underlying Principal or Secondary A aquifers or nearby watercourses; and
 - the presence of adjacent residential properties or sensitive ecological receptors.
- 11.5.11 A summary of the baseline CSM for the revised scheme (Stage B₁) is provided Table 14. The impacts and baseline risks quoted are before any mitigation is applied.
- 11.5.12 The assessed baseline risk is based on the information provided at the time of assessment. Where limited information is available, it is based on precautionary, worst-case assumptions and may therefore report a higher risk than that which actually exists.

Table 14: Summary of baseline CSM for sites which may pose a contaminative risk for the revised scheme (construction Stage B₁)

Area reference ⁸⁷	Area name and classification	Main potential impacts	Main baseline risk ⁸⁸
1-14	Existing on-site railway land overlying the London Clay Formation. (Map LQ-01-001, C6 and D6).	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

⁸⁷ Each area is assigned a unique identification number (see SES2 and AP3 ES Volume 5: Appendix LQ-001-001-B1).

⁸⁸ 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.

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Area reference ⁸⁷	Area name and classification	Main potential impacts	Main baseline risk ⁸⁸
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate/low
		Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer).	Very low
		Potential impact to groundwater within the 'lower aquifer' (Principal bedrock aquifer).	Low
1-40, 1-04	Former on-site printing works and fuel filling station, overlying London Clay. (Map LQ-01-001, B6, C6 and D6).	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
		Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust.	Very low
1-27	Former on-site warehouse overlying a Secondary A (superficial) aquifer. (Map LQ-01-001, D7).	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
		Potential impact to groundwater within the Secondary A superficial aquifer.	Low
		Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust.	Very low

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Area reference ⁸⁷	Area name and classification	Main potential impacts	Main baseline risk ⁸⁸
1-35	On-site former building yard. (Map LQ-01-001, D5)	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
1-24, 1-29, 1-25, 1-26, 1-20	Former off-site printing works, wagon works, chemical works and other previous contaminative land uses overlying a Secondary A (superficial) aquifer. (Map LQ-01-001, D7).	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
		Potential impact to groundwater within the Secondary A superficial aquifer.	Low
1-33, , 1-32, 1-38, 1-01, 1-39, 1-44, 1-30, 1-08, 1-05	Former off-site printing works, foundry works, chemical works and other previous contaminative land uses overlying London Clay (Map LQ-01-001, C7, D5 and D7).	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
		Potential impact on human health off-site from contamination by inhalation of migrating ground-gas and volatile vapours from contaminated soil/water.	Very low to low

Temporary effects

- 11.5.13 An assessment of the effects of contamination has been undertaken by comparing the CSM developed for potential contaminated land sites at baseline, construction and post construction stages. In order to assess effects at the construction stage, the baseline and construction CSM have been compared.
- 11.5.14 Table 15 presents a summary of the construction effects obtained from a comparison of the baseline and construction impacts relating to the revised scheme. The construction risk assessment takes into account the implementation of the mitigation measures set out within the draft CoCP. A summary of the construction effects is presented in SES2 and AP3 ES: Volume 5 Appendix LQ-001-001.

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Table 15: Summary of temporary (construction) effects for Stage B1

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
1-14	Existing on-site railway land overlying the London Clay Formation. (Map LQ-01-001, C6 and D6).	<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 to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through retaining wall construction through the London Clay Formation: very low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal Bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.</p>	<p>N/A – receptor not present</p> <p>N/A – receptor not present</p> <p>Very low</p> <p>Low</p>	Negligible (not significant)
1-40, 1-04	Former on-site printing works and fuel filling station, overlying London Clay. (Map LQ-01-001, B6, C6 and D6).	<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 human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust: low/very low</p>	<p>N/A – receptor not present</p> <p>Low – very low</p>	Negligible (not significant)
1-35	On-site former building yard. (Map LQ-01-001, D5)	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.	Low	Negligible (not significant)

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Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
1-27	Former on-site warehouse overlying a Secondary A (superficial) aquifer. (Map LQ-01-001, D7).	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. Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust: very low. Impact from leaching of contaminants from soil to groundwater Secondary A superficial aquifers: low.	N/A – receptor not present Very low Low	Negligible (not significant)
1-24, 1-29, 1-25, 12-6, 1-20	Former off-site printing works, wagon works, chemical works and other previous contaminative land uses overlying a Secondary A (superficial) aquifer. (Map LQ-001-01, D7)	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. Impact from leaching of contaminants from soil to groundwater Secondary A superficial aquifers: low.	N/A – receptor not present Low	Negligible (not significant)
1-33, 1-32, 1-38, 1-01, 1-39, 1-44, 1-30, 1-08, 1-05	Former off-site printing works, chemical works and other previous contaminative land uses. (Map LQ-001-01, C7, D5 and D7)	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. Potential impact on human health off-site humans to contamination by inhalation of volatile vapours from contaminated soil/water: very low to low.	Low to mod/low Very low to low	Negligible (not significant)

11.5.19 The baseline and construction CSM have been compared to determine the change in level of risk to receptors during the construction stage, and thus to define the level of effects at the construction stage. Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible even if the risk will remain as high. This will be the case where the construction of the revised scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.

- 11.5.20 Table 15 indicates that during construction activities there will be an overall negligible to minor adverse effect on identified receptors which is not considered significant.
- 11.5.21 Risks to groundwater quality in the lower aquifers from piling works will be managed in accordance with the draft CoCP (refer to in the main ES: Volume 5 Appendix CT-003-000) and good practice, including the Environment Agency guidance on piling and penetrative ground improvement⁸⁹. There will therefore be a negligible effect on the groundwater quality within the lower aquifer during construction, which is not significant.
- 11.5.22 Construction site compounds located in this study area will include staff welfare facilities, maintenance facilities for plant and machinery and fuel storage in bunded tanks. Construction compounds will store and use potentially contaminative materials such as fuels, oils and solvents, and the measures outlined in the draft CoCP will manage risks from the storage of such materials.
- 11.5.23 It will be unlikely that additional remediation works will be required over and above the mitigation measures contained as standard in the draft CoCP.
- 11.5.24 There are likely to be no significant cumulative temporary effects from construction.

Permanent effects

- 11.5.25 Baseline and post-construction CSM have been compared to assess the permanent (post-construction) effects. The post-construction CSM assumes that all the required remediation has been carried out and validated.
- 11.5.26 Table 16 includes the summary of the permanent (post-construction) effects obtained from a comparison of the baseline and post-construction impacts, and whether these are significant. The details of these comparisons are presented in the SES2 and AP3 ES: Volume 5 Appendix LQ-001-001.

⁸⁹ Environment Agency (2001), *Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination*: Guidance on Pollution Prevention. National Groundwater & Contaminated Land Centre, Project NC/99/73. Solihull.

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Table 16: Summary of permanent (post-construction) effects during Stage B1

Area reference	Area name	Main baseline risk	Main post-construction risk	Post-construction effect and significance
1-14	Existing on-site railway land overlying the London Clay Formation. (Map LQ-01-001, C6 and D6).	<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 to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: very low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Principal Bedrock aquifer) through piling or retaining wall construction through the London Clay Formation: low.</p>	<p>Low</p> <p>Moderate/low</p> <p>Very low</p> <p>Low</p>	Negligible to minor beneficial (not significant)
1-40, 1-04	Former on-site printing works and fuel filling station, overlying London Clay. (Map LQ-01-001, B6, C6 and D6).	<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 contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust: very low to low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall construction through the</p>	<p>Low to very low</p> <p>Very low</p> <p>Very low</p>	Negligible to minor beneficial (not significant)

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Area reference	Area name	Main baseline risk	Main post-construction risk	Post-construction effect and significance
		London Clay Formation: very low.		
1-35	On-site former building yard (Map LQ-01-001, D5)	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.	Very low	Negligible to minor beneficial (not significant)
1-27	Former on-site warehouse overlying a Secondary A (superficial) aquifer. (Map LQ-01-001, D7).	<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.</p> <p>Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust: very low.</p> <p>Impact from leaching of contaminants from soil to groundwater Secondary A superficial aquifers: low.</p>	<p>Very low</p> <p>Very low</p> <p>Very low</p>	Negligible to minor beneficial (not significant)
1-24, 129, 125, 126, 1-20	Former off-site printing works, wagon works, chemical works and other previous contaminative land uses overlying a Secondary A (superficial) aquifer. (Map LQ-001-01, D7)	<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.</p> <p>Impact from leaching of contaminants from soil to groundwater Secondary A superficial aquifers: low.</p> <p>Potential impact to groundwater within the 'lower aquifer' (Secondary A bedrock aquifer) through piling or retaining wall</p>	<p>Very low</p> <p>Very low</p> <p>Very low</p>	Negligible to minor beneficial (not significant)

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Area reference	Area name	Main baseline risk	Main post-construction risk	Post-construction effect and significance
		construction through the London Clay Formation: very low.		
1-33, , 1-32, 1-38, 1-01, 1-39, 1-44, 1-30, 1-08, 1-05	Former off-site printing works, chemical works and other previous contaminative land uses. (Map LQ-001-01, C7, D5 and D7)	<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 of-site humans to contamination by inhalation of volatile vapours from contaminated soil/water: very low to low.</p> <p>Impact from leaching of contaminants from soil to groundwater Secondary A aquifers (refers only to polygons 1-29, 1-25, 1-26, Map LQ-01-001, D7): low.</p>	<p>Low to Moderate/low</p> <p>Very low to low</p> <p>Low</p>	Negligible (not significant)

- 11.5.27 In Table 16, the magnitude of the permanent effects and their significance has been determined by calculating the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance is deemed to be negligible even if the risk will remain as high. This will be the case where the construction of the revised scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.
- 11.5.28 Table 16 Indicates that, following any remediation which may be undertaken, there will be an overall negligible to minor beneficial effect on the areas of land identified as posing a contaminative risk within the area required to build the revised scheme.
- 11.5.29 Depending on the type of remediation undertaken, the beneficial effect recorded for certain sites is most likely to arise from the removal of contamination sources and direct contact, or dust pathways, by the construction of new hard surfaces (for example on the construction sites) and from the new station buildings or track bed materials (in the operational part of the revised scheme).
- 11.5.30 There will be a negligible effect on all sites identified as posing a contaminative risk that are located outside of the area required to build the revised scheme.

Assessment of impacts and effects

Operation

- 11.5.31 An auto-transformer station will have been constructed adjacent to the tunnel portal by the end of 2026 and will therefore be present during Stage B1 operation. An auto-transformer station can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, the proposed auto-transformer station, in common with other modern substations, will use secondary containment appropriate to the level of risk.
- 11.5.32 There will be the potential for minor leakage of hydraulic or lubricating oils from high speed trains. Any leakage or spillage is expected to be very small and will not lead to any significant contamination.
- 11.5.33 There are no proposed depots within the study area.
- 11.5.34 Future station users have been considered in the operational phase risk assessments for the areas identified as posing a contaminative risk and that will include the partially remodelled Euston station (refer to Table 12 and Table 15 and the CSM presented in the SES2 and AP3 ES Volume 5: Appendix LQ-001-001, Section 3).
- 11.5.35 The risk assessment for the operation of the revised scheme may specify measures set out in the draft CoCP and implemented during the construction phase to remove, treat or isolate contamination. Further measures could also include the construction of permanent embedded design features in buildings – 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 station users from pre-existing contamination sources will be low to very low.
- 11.5.36 It is therefore likely that there will be no significant impacts to future station users from pre-existing land contamination.
- 11.5.37 Overall, there will be no significant operational effects associated with land quality in the Euston area.

Other mitigation measures

- 11.5.38 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 revised scheme.

Summary of likely residual significant effects

- 11.5.39 No significant residual effects are likely, associated with the operation of the revised scheme.

11.6 Effects arising during operation (2033 onwards)

- 11.6.1 The effects arising during full operation will be the same as those described for operation of HS2 in Stage B1 construction and operation. Therefore no significant residual effects are likely.

12 Landscape and visual assessment

12.1 Introduction

- 12.1.1 This section presents the assessment of the likely significant landscape and visual effects. It starts by summarising the baseline conditions found within and around the area of the revised scheme and goes on to describe the significant effects that will arise during Stage A construction (between 2017 and 2026); Stage B1 construction and operation (2026-2033); and operation (post 2033) on LCAs and visual receptors.
- 12.1.2 In this section, the operational assessment refers not just to the running of the trains but also the presence of the new permanent infrastructure associated with the revised scheme.
- 12.1.3 Principal landscape and visual issues in the area include:
- temporary effects to LCAs and visual receptors during construction arising from the presence of construction plant and construction compounds, demolition of buildings, bridge replacements, road widening, the removal of existing trees and the closure of public open space, and traffic and pedestrian diversions; and
 - permanent landscape and visual effects during operation arising from the presence of new structures in the landscape including the raised Hampstead Road Bridge and Granby Terrace Bridge, the loss of open space and mature trees in St James's Gardens, the loss of mature trees from and changes to Euston Square Gardens, the presence of hardstanding⁹⁰ and structures associated with the Euston portal and tunnel ventilation/emergency intervention in the station approach, the addition of new public open spaces around the station, changes to the road layout, additional cycle parking, underground station entrances and emergency accesses, and the addition of the high speed station and trains.
- 12.1.4 A separate, but related, assessment of effects on the setting of heritage assets is included in Section 9. Further details on the landscape and visual assessment, including baseline information and assessment findings, are presented in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, which comprises the following:
- Part 1 Introduction;
 - Part 2 Environmental baseline report;
 - Part 3 Assessment matrices; and
 - Part 4 Schedule of non significant effects.
- 12.1.5 The extent of the landscape and visual study area, the distribution of visual receptor viewpoints and the location of verifiable photomontages were discussed with the GLA, LBC and WCC during preparation of the main ES. Summer field surveys, including photographic studies of LCAs and visual assessment of viewpoints, were

⁹⁰ Hardstanding over the high speed railway will include the roof of the high speed dive unders south of Mornington Street Bridge which could be used as the base for potential future OSD – this is also referred to as a deck.

undertaken from June to October 2012, June 2013, between August and September 2014 and between May and June 2015. Winter surveys were undertaken in December 2012 and from January to March 2013.

12.2 Scope, assumptions and limitations

- 12.2.1 The assessment scope, key assumptions and limitations for the landscape and visual assessment are set out in Volume 1 of the main ES, the SMR (Volume 5: Appendix CT-0001-000/1) and the SMR Addendum (Volume 5: Appendix CT-0001-000/2). The SMR addendum outlines the amendments made to the SMR as a result of the methodology having undergone refinement as a result of its application within the EIA.
- 12.2.2 The extent of the study area has been informed by construction and operational phase zones of theoretical visibility (ZTV), which are shown in Maps LV-07-001 to LV-07-002a and LV-08-001 to LV-08-002a (SES2 and AP3 Volume 5, Landscape and Visual Assessment Map Book). The ZTV has been produced in line with the methodology described in the SMR Addendum (Volume 5: Appendix CT-001-000/2 of the main ES), and is an indication of the theoretical visibility of the revised scheme. In some locations, extensive vegetation cover will mean the actual visibility is substantially less than that shown in the ZTV and professional judgement on site has been used to refine the study area to focus on likely significant effects. As described in the SMR, tall construction plant (e.g. cranes and piling rigs) are excluded from the ZTV for the construction phase and overhead line equipment is excluded from the ZTV for the operational phase, but these are described and taken into account in the assessment of effects on LCAs and visual receptors.
- 12.2.3 LCAs and visual receptors within approximately 500m of the revised scheme have been assessed as part of the study area. Long distance views of up to 1km have been considered at locations such as Regent’s Park. At the request of stakeholders, very long distance views that include Euston have also been considered, including a number of protected vistas as defined in the London View Management Framework⁹¹.

Assumptions

- 12.2.4 Utility works have been assessed on the available information about the scale and duration of excavations. Utilities works will be temporary in nature and are a common place occurrence in urban areas. Trees will be retained where reasonably practicable, in line with the draft CoCP (Volume 5, Section 12, in Appendix CT-003-000 of the main ES), and disturbance minimised. There will be replanting wherever possible in areas where trees are removed. Where the underground service diversions are predicted to be large scale and will require trenches greater than 3m wide by 3m deep (see Figure 8, Section 5.3), it has been assumed that the works will require the removal of existing street trees and the loss of these trees has been assessed. The effects of trenching required for smaller scale underground service diversions have not been assessed as there are likely to be opportunities for avoiding tree roots through careful alignment of the utility trenches.

⁹¹ Greater London Authority, (2012), *London View Management Framework SPG March 2012*.

Limitations

- 12.2.5 During the baseline survey there were some areas which were inaccessible (such as private land, commercial premises and residential buildings). In these instances, professional judgement has been used to assess views from these locations.
- 12.2.6 The design of public realm, which includes reinstatement of Euston Square Gardens, is at a preliminary stage. The extent of public realm that forms part of the revised scheme is shown on Map CT-06-001, (Volume 2, CFA1 Map Book of the SES2 and the AP3 ES) and Figure 6 (Section 5.2).

12.3 Environmental baseline

- 12.3.1 The revised scheme includes visual receptors as set out in Volume 5 SES2 and AP3 ES Appendix LV-001-001, Part 2.

Existing baseline

Landscape baseline

- 12.3.2 The study area is focussed on Euston station and comprises a densely developed area of central London. A varied mix of building styles, ages and layout reflects distinct development periods. The underlying topography is largely masked by urban development. However, the rising ground to the north of the station is evident in the open spaces of Primrose Hill, Parliament Hill and Hampstead Heath. Primrose Hill and Regent's Park to the north-west counterbalance the developed areas and include large expanses of parkland and mature trees. Smaller, formal squares are integrated into the fairly regular grid street pattern, including Euston Square Gardens to the south of the station and St James's Gardens to the west. Late 20th century medium and high rise residential estates are set in communal open spaces. Street trees and occasional areas of amenity planting make up the remainder of the vegetation within the study area. The A501 Euston Road, the primary road within the study area, passes to the south of Euston station. Immediately adjacent to the station are the A4200 Eversholt Street to the east and Melton Street/Cardington Street to the west. The A400 Hampstead Road, crosses over the railway corridor to the north of the station. A network of smaller residential roads provides access locally.
- 12.3.3 The LCAs have been determined with reference to the London Landscape Framework⁹². The revised scheme lies in the Hampstead Ridge Natural Landscape Area 5: the character of the area is summarised as containing (largely) Victorian terraced housing around historic settlement cores, with prominent rail and road infrastructure and extensive industrial and modern residential development.
- 12.3.4 Descriptions of all LCAs are provided in SES2 and AP3 ES, Volume 5 Appendix LV-001-001, Part 2. For the purposes of this assessment, the study area has been subdivided into nine discrete LCAs, three of which are most likely to be significantly affected. A summary of these LCAs is provided in Sections 12.3.5 to 12.3.7. The LCAs are shown in the Maps LV-02-001 to LV-02-002a (Volume 5, Landscape and Visual Assessment Map Book) of the main ES.

⁹² Alan Baxter, Sheils Flynn, (2011), *London's Natural Signatures: The London Landscape Framework*, Natural England.

Euston Road Commercial Area LCA

- 12.3.5 The LCA includes a mixture of residential, institutional and commercial uses. The character of the area is dominated by Euston Road and the substantial scale of buildings that line it. Immediately south of the station is Euston Square Gardens, an important open space containing many mature trees, some of high quality that, together with the adjacent bus station and station forecourt buildings provide visual enclosure for the space. Euston Square Gardens, although well-maintained, are worn and often contain litter, as is typical of a heavily used urban area. The paths through the gardens are busy through-routes for pedestrians and hence they have a more functional than recreational character. St James's Gardens, to the west of the station, is similarly surrounded by built form and dominated by mature trees which create a shaded space in summer and winter. St James's Gardens have a slightly run down appearance which detracts from their quality and condition. The partial use of Friends House Garden as a construction compound for the neighbouring Friends House development detracts from the former character of a well maintained semi-private space but it is assumed that this will have been reinstated with tree and shrub planting prior to the commencement of construction Stage A. The 20th and 21st century development along the Euston Road and the dense urban fabric to the north and south of the road give the LCA an inner city character. Overall, the landscape condition is fair and the high levels of pedestrian and vehicular through traffic means that tranquillity is low. The southern part of the LCA is located in the Bloomsbury Conservation Area. The area around Cobourg Street is largely residential in use and scale. Due to the presence of the Euston Road, and the mixed quality, scale and style of the architecture in the area, overall, the landscape is of local value. Therefore, this area has a medium sensitivity to change.

Euston West Post-War Residential LCA

- 12.3.6 This area is centred on the Regent's Park Estate which is west of Hampstead Road and the railway corridor. Post-war residential apartment blocks, ranging from four to ten storeys, are the dominant built form in the area. The style of architecture is relatively consistent and there are no listed buildings within the character area. There are extensive areas of communal open space and established vegetation around the base of the buildings and these, together with street trees, provide a landscape setting for the substantial height and mass of the apartment blocks. The dense urban development, large-scale buildings and existing vegetation contain long views. The landscape condition is fair reflecting the generally good levels of maintenance of the communal gardens and streets with the poor condition of some of the local buildings. The widespread on-street parking throughout detracts from the quality and condition of the character area. Residential areas are quieter than the busy main roads, which include Hampstead Road, but overall, tranquillity is low. The landscape is of local value. Therefore, this area has a medium sensitivity to change.

Regent's Park Georgian Residential LCA

- 12.3.7 Located within the Regent's Park Conservation Area, this area is largely residential with villas and terraces of high architectural quality, dating from the early 19th century: many are Grade I or II listed. The architect, John Nash, drew up a masterplan for the area and although the plan was only partially implemented, the development in the LCA reflects the overall style of Nash's scheme. The buildings include a wealth

of architectural details including arches, columns, pilasters, pediments, balconies and railings. They are up to four storeys high, built in stucco and stone, and front onto communal gardens. Chester Terrace overlooks Regent's Park. The combination of the distinctive architecture, the mature trees and planting in the communal gardens and the proximity to Regent's Park results in a character that is unique to this part of London. As a consequence of the area's architectural interest and its relationship with Regent's Park, the area is popular with tourists and visitors. The layout further east towards Park Village West and Park Village East is less formal with individual villas set in established mature gardens. The Regent's Park Barracks on Albany Street provides a continuous, austere brick frontage to the street. The housing, gardens and streets are well maintained and the area is of good condition. There is through traffic on Albany Street but the lack of traffic in most streets means that overall tranquillity is medium. The landscape is of regional landscape value due to its uniformly high architectural quality and consistency. Therefore, this character area has a high sensitivity to change.

Visual baseline

- 12.3.8 Descriptions of the identified representative viewpoints are provided in SES2 and AP3 ES, Volume 5 Appendix LV-001-001, Part 2. A summary description of the distribution and types of receptors most likely to be affected is provided below. The representative viewpoint locations for visual receptors are identified on Maps LV-07-001 to LV-07-002a and LV-08-001 to LV-08-002a (Appendix LV-001-001, CFA1 Map Book in Volume 5 of the SES2 and AP3 ES). In each case, the middle number of the reference (xxx.x.xxx) assigned to each visual receptor identifies the type of receptor that is present in this area – 1: Protected views, 2: Residential, 3: Recreational, 4: Transport, 5: Hotels and healthcare institutions, 6: Employment.
- 12.3.9 The following four additional representative viewpoints, which were not included in the main ES, have been included in the SES2 and AP3 ES assessment to take account of the revised scheme:
- Viewpoint 002.2.015: view north and west from Apartments on Amptill Estate and Barnby Street; and
 - Viewpoint 003.4.036: view east from the Outer Circle, adjacent to Regent's Park.
- 12.3.10 Protected views identified within the study area include protected vistas included in the LVMF SPG⁹³ and designated views on the Camden LDF⁹⁴ and Westminster LDF proposals map⁹⁵. Protected vistas include views from the following viewing places defined in the LVMF SPG:
- 5A.2 Greenwich Park: the General Wolfe Statue – looking towards St Paul's Cathedral;
 - 6A.1 Blackheath Point: near the orientation board – looking towards St Paul's

⁹³ Mayor of London, (2012), *London View Management Framework, Supplementary Planning Guidance*.

⁹⁴ London Borough of Camden, *Local Development Framework Proposals map*; <http://gis.camden.gov.uk/geoserver/LDF.html>; Accessed July 2013.

⁹⁵ Westminster City Council, *Local Development Framework Proposals map*; http://www3.westminster.gov.uk/maps/index_udp.cfm; Accessed September 2013.

Cathedral;

- 4A.1 Primrose Hill: the summit – looking towards St Paul’s Cathedral (reported in CFA3 Primrose Hill to Kilburn);
- 2A.1 Parliament Hill: the summit – looking towards St Paul’s Cathedral;
- 2A.2 Parliament Hill: the summit – looking towards the Palace of Westminster; and
- 2B.1 Parliament Hill: east of the summit – at the prominent oak tree looking towards Palace of Westminster (reported in CFA2, volume 2 of the main ES).

12.3.11 The locations are shown in maps LV-05-001, LV-05-002 and LV-05-003 (Volume 5, Landscape and Visual Assessment Map Book) of the main ES.

12.3.12 Designated views on the Westminster LDF proposals map⁹⁶ incorporate Strategic View Corridors and Wider Setting Corridors and include:

- Strategic View 1: Primrose Hill to St Paul’s Cathedral; and
- Strategic View 4: Parliament Hill to the Palace of Westminster.

12.3.13 Designated views identified in the Euston Planning Framework Supplementary Planning Document⁹⁷, which forms part of the Camden LDF, include the following strategic viewing corridors between:

- Primrose Hill and St Paul’s Cathedral;
- Greenwich and St Paul’s Cathedral; and
- Blackheath and St Paul’s Cathedral.

12.3.14 Protected views have also been identified in the Conservation Area appraisals for Regent’s Park⁹⁸; Camden Town⁹⁹; Bloomsbury¹⁰⁰; Primrose Hill¹⁰¹ and Regent’s Canal¹⁰². Specific designated views within the study area for CFA1, with views towards the revised scheme in the Camden Town Conservation Area statement include:

- views west along Parkway towards Regent’s Park, with views from the junction of Delancey Street and Parkway across the existing railway cutting to Park Village East; and
- panoramic views from the west end of Delancey Street along Mornington Terrace across the existing railway cutting to the south, with the housing blocks of the Regent’s Park Estate in the middle ground and the West End skyline, including the Euston and BT towers, in the background.

⁹⁶ Westminster City Council, *Local Development Framework Proposals map*; http://www3.westminster.gov.uk/maps/index_udp.cfm; Accessed September 2013.

⁹⁷ London Borough of Camden (2009) *Euston Planning Framework Supplementary Planning Document*

⁹⁸ London Borough of Camden, (2011), *Regent’s Park Conservation Area Appraisal and Management Strategy*.

⁹⁹ London Borough of Camden, (2007), *Camden Town Conservation Area Appraisal and Management Strategy*.

¹⁰⁰ London Borough of Camden, (2011), *Bloomsbury Conservation Area Appraisal and Management Strategy*.

¹⁰¹ London Borough of Camden, (2001), *Primrose Hill Conservation Area Statement*.

¹⁰² London Borough of Camden, (2008), *Regent’s Canal Conservation Area Appraisal*.

- 12.3.15 The following views are designated as important views in the Regent's Park Conservation Area statement:
- views of Chester Terrace from Chester Road and from Chester Place;
 - views from Mornington Street to Park Village East; and
 - views towards St Katherine's, the Danish Church, with its spires and precinct.
- 12.3.16 Residential receptors have a high sensitivity to change and are located close to and on both sides of the existing railway line, with some framed views along streets looking towards Euston station. In addition, some more distant views are possible from apartment blocks to the west and east of the study area. Existing views are all urban in character and typically include housing, office blocks and railway or road infrastructure. The dense urban development locally limits the extent of the views.
- 12.3.17 Recreational receptors, also with a high sensitivity to change, include users of Friends House Garden, Euston Square Gardens, Regent's Park and St James's Gardens.
- 12.3.18 People walking or cycling through residential streets have a medium sensitivity to change, but drivers and travellers on busy main roads, including Euston Road and Hampstead Road have a low sensitivity to change.
- 12.3.19 Employment receptors have a low sensitivity to change. Commercial uses are present throughout the study area but with a higher concentration close to the station building at Euston and along Euston Road. Views are characterised by the central London setting with busy thoroughfares, high rise buildings and some street trees.

Future baseline

- 12.3.20 SES2 and AP3 ES Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the revised scheme. These are termed 'committed developments' and those that are likely to be built and occupied prior to either the construction or operation of the revised scheme will form part of the baseline of the revised scheme. These developments are shown on Map CT-13-001- to CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book). A summary of the committed developments is provided below along with the consequential effect on the character of LCAs and nature of views. Developments that will introduce new visual receptors and may be significantly affected are also described.

Construction (2017)

- 12.3.21 There are a number of mixed use and residential developments within the study area, which it is assumed will be built and occupied by 2017. These developments will largely replace buildings of similar type and use or be additions to areas with buildings of a comparable scale and design. They will be largely characteristic of their setting. Overall, there will be no change to the overall sensitivity of the LCAs directly affected by these developments which include Euston East and West Post War Residential LCAs, Euston Road Commercial LCA, Camden Town Settlement Core LCA and Camden Town Commercial LCA.
- 12.3.22 In most cases the future developments would replace existing buildings or would be in an area where visual receptors have already been identified. Therefore they would not

affect existing views and would not generate new visual receptors by 2017. The planning application 2015/3076/P, submitted by LBC to provide additional homes within the Regent's Park Estate, to replace social housing that will be acquired and demolished for HS2, would introduce new buildings on previously undeveloped open land. It has been assumed that these buildings would be in their place by 2017. The presence of these buildings affecting existing views and potential visual effects of the revised scheme on their residents has been taken into account in the landscape and visual assessment.

- 12.3.23 Redevelopment of the former Odeon site and Rosenheim Building site bounded partly by Grafton Way, Tottenham Court Road, Huntley Street and University Street may give rise to potential cumulative effects as the likely programme for development runs until 2018.

Construction and operation (2026–2033)

- 12.3.24 There are further mixed use and residential developments within the study area which it is assumed will be built and occupied by 2026. They are located in the King's Cross Growth Area LCA. These developments will be additions to areas with existing buildings of a comparable scale and design and hence are largely characteristic of their setting. They will not change the overall sensitivity of the LCA.
- 12.3.25 Since, in each case, the future developments will replace existing similar buildings or will be in an area where visual receptors have been already identified, they will not affect existing views and will not generate new visual receptors by 2026.
- 12.3.26 It is assumed that Friends House Garden, located to the south of Euston Road and currently being partly used as a construction compound for the neighbouring Friends House development, will be reinstated with replacement tree and shrub planting prior to construction of the revised scheme.

Operation (2033)

- 12.3.27 No committed developments have been identified in this area that will materially alter the baseline conditions in 2033.

12.4 Effects arising during Stage A construction (2017–2026)

Effects arising during construction

- 12.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works will be visible in many locations and will have the potential to give rise to significant temporary effects which cannot be mitigated practicably. Such effects are temporary and vary over the construction period depending on the intensity and scale of the works at the time. Construction activities involving demolition and construction of large scale buildings and structures and the presence of large scale plant and machinery, work sites and construction compounds will be the most visually prominent components of the works. Demolition of existing buildings will typically result in a high magnitude of change to visual receptor viewpoints. Most of the construction works in Stage A will take place concurrently for most of the construction programme, thereby contributing to a 'peak construction phase', which has been used to assess potential landscape and visual effects.

12.4.2 The effects associated with the peak construction phase in the Euston area are generally considered to be long term, given the length of the construction programme (see Section 5.4 and Figure 9a and 9b). The majority of the main and satellite construction compounds will be in place for the whole of the Stage A construction period between 2017 and 2026.

12.4.3 The Stage A construction works are described in Section 5. The construction works, ordered from south to north, that have particular importance in determining the effects on landscape and visual receptors include:

- underground utility diversion works and associated removal of street trees;
- presence of construction sites and compounds surrounded by 2.4m high hoardings (or 3.6m hoardings where required for noise mitigation);
- removal of trees and loss of open space within Euston Square Gardens, construction of subsurface links to Euston Square underground station and relocation of the war memorial and the Robert Stephenson statue;
- construction of the entrance to Euston Square underground station on Gordon Street;
- demolition of commercial buildings including Grant Thornton House, One Euston Square and smaller retail outlets associated with the conventional station forecourt, Walkden House, Wolfson House and small hotels and residences to the south and south-west of Euston station;
- demolition of the former underground station entrance on the corner of Melton Street and Drummond Street, Hotel Ibis, 1 and 3 Cobourg Street, Thistle Euston Hotel, the National Temperance Hospital, the power signal box, the former BHS Ltd offices and distribution centre at 132-140 Hampstead Road, and the disused petrol filling station at 142 Hampstead Road;
- construction of the western side of the high speed station, including the western part of the station concourses, the western station roof and buildings fronting the realigned Cobourg Street, housing station accommodation, and permanent retail facilities;
- widening and reconfiguration of Cobourg Street and construction of Cobourg Street ventilation shaft building (with a height that will not exceed 45m AOD, about 20m above the existing ground level although the building is likely to be smaller in scale with an assumed 8m high building envelope in relation to the adjacent street level);
- removal of trees and loss of open space within St James's Gardens and construction of the Cobourg Street escape building (with an assumed 4m high building envelope in relation to the adjacent street level);
- to the north-east of the conventional station and railway, demolition of the Royal Mail NW1 delivery office and the portable offices in the Addison Lee vehicle storage compound;
- to the north-west of the station, demolitions include properties in the Regent's

Park Estate including Silverdale, Ainsdale and Eskdale, Granby House, Stalbridge House, and the carriage shed on Granby Terrace;

- removal of trees and loss of communal open space associated with properties to be demolished in the Regent's Park Estate (Silverdale, Ainsdale and Eskdale) and creation the open space north of Langdale;
- demolition and reconstruction of bridges crossing the railway line, including the Hampstead Road, Granby Terrace and Mornington Street bridges;
- construction of Park Village East barrette retaining wall, including piling works and parapet reinstatement;
- construction of decks south of Mornington Street Bridge to allow future OSD;
- construction of a portal headhouse in the railway cutting adjacent to Park Village East; the Mornington Street Bridge ventilation building adjacent to the rebuilt Mornington Street Bridge; and an emergency access and fire fighting (intervention) building adjacent to the reconstructed Granby Terrace Bridge. Each of these buildings is likely to be up to 8m high in relation to adjacent street levels in Park Village East; and
- construction of the Euston portal, including excavation and piling works.

Avoidance and mitigation measures

12.4.4 Measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction include the following (see Volume 5, Appendix CT-003-000 of the main ES):

- measures to reduce landscape and visual impacts associated with temporary site offices, vehicles, construction plant and compounds (draft CoCP, Section 12);
- avoidance of unnecessary tree and vegetation removal, and protection of existing trees in accordance with BS 5837: Trees in relation to design, demolition and construction (draft CoCP, Section 12);
- use of well-maintained hoardings and fencing (draft CoCP, Section 5);
- prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles and machinery (draft CoCP, Section 12);
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses (draft CoCP, Section 5); and
- replacement of any trees intended to be retained which may die as a consequence of nearby construction works (Section 12).

Assessment of impacts and effects

12.4.5 The most apparent changes to landscape character and views during construction will relate to the presence of construction plant and the removal of existing landscape elements, the demolition of buildings and the loss of existing trees. Changes will be

marked adjacent to the existing railway corridor and Euston station, most notably between Melton Street and Cobourg Street, with the demolition of existing buildings, and entire closure of St James's Gardens to accommodate the National Temperance Hospital main compound. To the south of Euston station, demolitions and the use of Euston Square Gardens for satellite construction compounds will limit access and directly affect the gardens. Additional notable changes will occur in the Regent's Park Estate with demolitions and loss of communal gardens west of Hampstead Road, and along the railway corridor with construction of the tunnel portal, high speed dive under, decks over the high speed railway and replacement bridges. The height of the construction plant and the close proximity of construction activities to viewpoints, particularly where existing buildings have been removed, will allow direct views of construction activity.

- 12.4.6 The effect of works associated with underground utilities (greater than 3m wide by 3m deep) has been assessed. Works may affect existing street trees along Euston Road, Eversholt Street, Phoenix Road, Chalton Street, Melton Street, Cobourg Street, Robert Street, Varndell Street, Harrington Street, Albany Street, Mackworth Street, Augustus Street, in Regent's Park adjacent to the London Zoo coach and car park, Harrington Square Gardens, Ampthill Estate and Mornington Terrace. Utility works will be temporary in nature and are a common occurrence in urban areas. Trees will be retained where reasonably practicable, in line with the draft CoCP (Section 12, Volume 5 in Appendix CT-003-000 of the main ES), and disturbance minimised. Where vegetation is removed, there will be replanting wherever possible within the constraints of the new utility routes.

Landscape assessment

- 12.4.7 The following section describes the likely significant effects on LCAs during construction. All LCAs within the study area considered to experience a non-significant effect (minor adverse or negligible) are described in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Euston Road Commercial Area LCA

- 12.4.8 The revised scheme will introduce large-scale construction activity into this LCA, associated with the new high speed station and the new connection to Euston Square underground station on Gordon Street. Construction activities will include the demolition of commercial and residential properties (including Grant Thornton House) and the removal of street trees along Melton Street and Cobourg Street. Mature trees will also be removed along Euston Road, within Euston Square Gardens and St James's Gardens to facilitate below-ground works. Public access to Euston Square Gardens will be limited during construction and a temporary taxi stand will be constructed in the western section of the gardens. St James's Gardens will be closed and all trees will be removed except for those along the southern edge of the gardens. Large-scale piling works for the construction of new retaining walls will take place to the west of the existing station in order to construct the high speed platforms.
- 12.4.9 The prominent, large-scale and intense construction activities will not be in keeping with the context of the domestic character of sections of Cobourg Street and neighbouring streets. The scale of the construction activity along Euston Road will be less apparent given the substantial width of the Euston Road, the prominence of traffic moving along the road and the large scale of the existing buildings that line it.

- 12.4.10 Construction sites are a common feature in central London. However, the increase in vehicle movements and activity will reduce tranquillity along some residential streets, but not close to the busy Euston Road.
- 12.4.11 While construction activities will be prominent, impacts will be largely limited to parts of the LCA adjacent to the existing station. However, construction will result in the removal of some characteristic components from the LCA, for example, the residential scale buildings east of Cobourg Street and trees from Euston Square Gardens. Therefore the overall magnitude of change will be high and will be continue throughout most of construction Stage A.
- 12.4.12 The high magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a major adverse significant effect.

Euston West Post-War Residential LCA

- 12.4.13 Activities within this LCA will include utility diversion works, which, as a worst case, will require the removal of street trees from Robert Street, Varndell Street, Harrington Street, Albany Street, Mackworth Street and Augustus Street. Hampstead Road Bridge and the Granby Terrace Bridge will be demolished and reconstructed. Activities also include the demolition of post-war residential blocks to the west of the railway corridor and north of Cardington Street, including Silverdale, Ainsdale and Eskdale, as well as Granby House and Stalbridge House, the power signal box and former BHS Ltd offices and distribution centre. Some existing areas of vegetation, including trees and shrubs around the residential blocks and street trees, will be removed as a part of the construction works. Other elements of the revised scheme will be constructed within the adjacent Euston Station Gateway LCA and within a wider railway corridor in a cutting at a lower level than the surrounding land. These lower level elements will require the demolition of the carriage shed north of Granby Terrace Bridge and along Park Village East, excavation of material, followed by the installation of piled retaining walls along the west side of the high speed station and parts of the station approach. The construction of the dive under structure will also take place in the station approach alongside the Line X reinstatement works and there will be decks above the high speed railway south of Mornington Street Bridge. There will be an emergency intervention building to service the high speed railway which will be located on the deck adjacent to the rebuilt Granby Terrace Bridge.
- 12.4.14 Only a small part of the LCA will be directly affected by the main construction works. However, the diversions and temporary road closures will affect a wider area of the LCA due to the impact upon vehicular and pedestrian access and the presence of construction traffic on the smaller roads within the Regent's Park Estate. The increase in activity and lighting associated with the construction works will markedly reduce tranquillity in the LCA.
- 12.4.15 The construction works will take place adjacent to a busy railway corridor. However, the large scale of the construction activities will require the removal of characteristic elements including a number of existing buildings, street trees and communal gardens associated with the high rise residential blocks. Construction compounds and bridge works will be prominent.
- 12.4.16 The overall magnitude of change will be high although construction will be limited to a small part of the LCA, mostly adjacent to the existing station and railway corridor.

This high magnitude of change is likely to occur throughout most of construction Stage A.

- 12.4.17 The high magnitude of change, assessed alongside the medium sensitivity of the LCA, will result in a major adverse significant effect.

Regent's Park Georgian Residential LCA

- 12.4.18 Construction within and immediately adjacent to this LCA will include the construction of the tunnel portal, the dive under structures, reinstatement of Line X, the demolition and reconstruction of Mornington Street Bridge and the reconstruction of the retaining wall (including piling) along Park Village East. The Park Village East (north) satellite compound will be present at the northern end of Park Village East, partly within the adjacent Euston Station Gateway LCA, and will support construction activities in the adjacent railway cutting. The majority of the LCA is located to the west of Park Village East and will not be directly affected by the revised scheme.
- 12.4.19 At the Euston portal, the existing railway is in cutting approximately 10m below street level and lies within the adjacent Euston Station Gateway LCA. A portal headhouse, a multi-storey structure with the main structure below street level, will be built above the western high speed track (northbound), immediately south of the tunnel entrance. The roof of the headhouse will be at street level and will provide a proportion of the emergency parking required at the portal, with the road along Park Village East providing the remainder. There will be an entrance building for access and egress on the headhouse roof, occupying a relatively small footprint and up to 8m in height above street level. Decks will be constructed over the dive under structures south of Mornington Street Bridge, on the western side of the railway corridor. As part of the construction of the retaining wall along Park Village East, phased closure of the road will be required. Pedestrian and emergency access will, however, be maintained. The parapet wall, raised planter and associated shrubs and semi-mature trees along the northern sections of Park Village East will be removed and a similar wall and planter will be reprovided as part of the Stage A construction works. There will also be views of the of the Mornington Street Bridge works as well as the Mornington Terrace sidings and Mornington Street overbridge satellite compounds on the far side of the existing railway.
- 12.4.20 The increase in traffic movements and activity associated with the construction works will noticeably reduce tranquillity locally within the LCA.
- 12.4.21 Construction will be limited to the areas of the LCA immediately adjacent to the existing railway corridor and will introduce large-scale construction plant adjacent to domestic buildings. The removal of trees and planting in the raised planter will result in the loss of part of a key characteristic of the Regent's Park Conservation Area. However, as the extent of construction will be limited to Park Village East, the overall magnitude of change will be medium.
- 12.4.22 The medium magnitude of change, assessed alongside the high sensitivity of the LCA, will result in a moderate adverse significant effect. This medium magnitude of change is likely to occur throughout most of construction Stage A.

Visual assessment

- 12.4.23 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken assuming winter conditions, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, will be in leaf. In most cases, additional lighting will not give rise to significant effects due to the widespread presence of existing lighting in the urban areas. No assessment has been undertaken where there will be no direct foreground visibility of additional lighting or where new lighting would be of a similar nature to existing lighting. Night time assessments have, however, been undertaken for residential or hotel receptors in areas where the foreground of the view is predominantly unlit and continuous lighting is proposed throughout the night. Any significant effects at night-time, arising from this additional lighting are presented in this section.
- 12.4.24 Representative viewpoints within the study area that will experience a non-significant effect (minor adverse or negligible) are described in SES2 and AP3 ES, Volume 5: Appendix LV-001-001 Part 4.
- 12.4.25 The viewpoint locations for visual receptors that will be significantly affected as a result of the Stage A construction works are identified on Maps LV-03-001 to LV-03-002a (Volume 2, CFA 1 Map Book of the SES2 and AP3 ES). In each case, the middle number of the reference number (xxx.x.xxx) assigned to each visual receptor identifies the type of receptor that is present in this area – 1: Protected views, 2: Residential, 3: Recreational, 4: Transport, 5: Hotels and healthcare institutions, 6: Employment.
- 12.4.26 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity will be lower than those reported.

Viewpoint 001.4.001: view looking north along Gordon Street in front of UC

- 12.4.27 The revised scheme will be located approximately 75m north from this viewpoint. The hoarding and temporary construction accommodation at the Gordon Street satellite compound will be prominent in the foreground of the view together with large construction plant. The removal of trees in Euston Square Gardens, which currently form the background of the view, together with the demolition of Grant Thornton House and One Euston Square will result in the alteration to key characteristics of the view. Overall, the magnitude of change will be medium.
- 12.4.28 The medium magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 001.4.002: view looking north from the corner of Euston Road and Gordon Street

- 12.4.29 Construction activities and the presence of large plant associated with the Euston Road subway, including the temporary modular bridges and the Gordon Street underground entrance, will dominate the foreground, although they will be viewed in the context of traffic along Euston Road. The removal of many mature trees in Euston Square Gardens and along Euston Road will open up the view substantially, increasing the prominence of large construction plant in Euston Square Gardens and Melton

Street. Similarly, the demolition of Grant Thornton House and One Euston Square will open views northwards. Melton Street will be closed and hoardings along the eastern façade of 1 to 9 Melton Street and the western section of Euston Square Gardens will partially screen views of construction activity from street level. Open and elevated views of the construction activity will be possible from Drayton House and the Wellcome Research Institute (four to six storeys high). Overall, the magnitude of change will be high.

- 12.4.30 The high magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 001.6.003: view north-east from 215 Euston Road

- 12.4.31 Intervening buildings and vegetation will screen the views from pedestrians and vehicles looking east along Euston Street towards the construction works. Cranes will be visible in the background above intervening buildings and vegetation representing a change in the background of the view, as a series of components in the wider panoramic view. Trees, which are a key characteristic of this view, will be removed along Euston Road and many trees will also be removed from Euston Square Gardens. The buildings in the foreground will screen the majority of the construction activity and views from the buildings will be oblique. Overall, the magnitude of change will be medium.
- 12.4.32 The medium magnitude of change assessed against the low sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 001.2.008: view looking north and east from Cobourg Street

- 12.4.33 The high speed station footprint will extend along the east side of Cobourg Street, adjacent to this viewpoint. The view from the four storey residential properties and the Exmouth Arms public house looking east will be dominated by the hoarding at lower levels and by demolition works and large-scale construction plant above. Views north along Cobourg Street will be framed by hoardings to the east and the existing properties to the west and oblique views of the high speed station construction works will be obtained above these hoardings. The demolition of existing buildings, including the Ibis Hotel, 1 and 3 Cobourg Street and the removal of trees in St James's Gardens will open up views of construction activity, substantially changing the existing view. This will result in a high magnitude of change.
- 12.4.34 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.35 Effects at night will be non-significant in a context of existing street lighting and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Viewpoint 001.2.009: view east from North Gower Street looking along Starcross Street

- 12.4.36 Views from the four storey residential properties on North Gower Street and Starcross Street will remain largely screened by existing buildings. There will be framed views of the edge of the construction site, bounded by hoardings in the middle ground of the view (approximately 55m from the viewpoint). Demolition of the buildings on Cobourg Street will be noticeable but will not substantially change the view from the

properties, (approximately 100m from the viewpoint). Cranes and other tall plant will be visible in the background above intervening buildings. Overall, the magnitude of change will be medium.

- 12.4.37 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.
- 12.4.38 Effects at night will be non-significant in a context of existing street lighting and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Viewpoint 001.5.011: view east from the Wesley Hotel

- 12.4.39 The high speed station footprint and below-ground works will require the demolition of the three storey buildings along sections of both Cobourg Street and Euston Street, opening up views to the north and east. Construction activity will be visible in the foreground and middle ground of the view from the upper storeys looking east and in oblique views looking north east. In the context of a central London location, the overall magnitude of change will be medium as hoardings, construction works and new features will be clearly seen but largely characteristic of the existing setting.
- 12.4.40 The medium magnitude of change assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.41 Effects at night will be non-significant in a context of existing street lighting and are reported in SES and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.015: views east along Robert Street

- 12.4.42 The demolition of the National Temperance Hospital will open up views eastwards with glimpsed views of cranes also possible in the background. The removal of trees within St James's Gardens in the background of the view will also be apparent. Hoardings will be erected in front of the National Temperance Hospital to demarcate the working area, screening views at ground level, but views of the multi-storey portable cabins (up to six storeys high) will be possible. Very limited, oblique views of the construction activities may be possible from the Woodhall residential block. It has been assumed, that street trees will be removed as a result of utility diversion works along Robert Street, which will open up views towards the revised scheme for users of Robert Street. Overall, the magnitude of change will be medium.
- 12.4.43 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.44 Effects at night will be non-significant in a context of existing street lighting and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.016: view east from Hampstead Road, near the Tarns and Rydal Water apartment blocks

- 12.4.45 The National Temperance Hospital main compound will be located approximately 40m from this viewpoint. Views from The Tarns, a new Regent's Park Estate residential block located on the eastern side of Rydal Water and the community centre and footpaths on Hampstead Road, will be towards the up to six storey high temporary site offices and site hoardings which will partially screen views of the works beyond. The construction compound will be highly visible after the demolition of the

National Temperance Hospital and BHS Ltd offices and distribution centre but views will be largely truncated by the temporary site offices. The temporary site offices will be of a similar scale to the existing buildings. Cranes will also be visible in the background above intervening buildings. There will be some oblique middle distance views of the Hampstead Road Bridge works from the upper floors of the apartment blocks. Views from the Rydal Water residential block are likely to be substantially truncated by the replacement housing block, which will be developed before construction of the revised scheme, and will replace existing trees in front of Rydal Water. Overall, the magnitude of change will be high.

- 12.4.46 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.47 Effects at night will be non-significant in a context of existing street lighting and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.017: views north and north-east from Staveley and Waterhead residential blocks on Varndell Street

- 12.4.48 There will be direct views north, along Harrington Street, of construction works from the residential flats located on Varndell Street framed by existing buildings. Views from the Waterhead residential block will be partially screened by one of the new Regent’s Park Estate residential blocks, which will be developed prior to the commencement of construction of the revised scheme and will replace existing trees at the front of Newlands. However, framed views of the works associated with Hampstead Road Bridge will be visible from upper floors of the Waterhead residential block. The foreground of the view is open along Harrington Street, with the edge of the construction works highly visible in the middle ground and background. From the upper floors of flats on Varndell Street, cranes will be visible in the middle and background of the view largely above intervening buildings. The demolition of buildings and the loss of trees will represent a substantial change to the view. Views are partly filtered by built form in the middle ground of the view. Overall, the magnitude of change will be medium.
- 12.4.49 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.50 Effects at night will be non-significant in a context of existing street lighting and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.020: view looking north-east from Langdale residential block and Augustus House

- 12.4.51 The revised scheme will be located approximately 20m from this viewpoint. There will be close and direct views from the eight to ten storey modern flats, including Langdale and Augustus House, on Stanhope Street. Construction works, including the demolition of existing high rise apartment blocks which result in opening up views across the railway corridor, the removal of vegetation and activities within the Granby Terrace overbridge satellite compound will be highly visible in the foreground. Cranes and construction activities will also be prominent in the background and middle ground, associated with the demolition/reconstruction works on the Hampstead Road and Granby Terrace bridges, the demolition of the carriage shed, and construction of

the southern high speed dive under. Replacement amenity open space will be constructed¹⁰³ in the southern part of the Granby Terrace overbridge satellite compound at the end of construction Stage A when this compound reduces in size. Overall, due to the major alteration to the key characteristics of the view the magnitude of change will be high.

- 12.4.52 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.53 At night, continuous lighting is proposed at the Granby Terrace overbridge satellite compound. The communal gardens are not well lit and the magnitude of change to this receptor at night will be medium, resulting in a moderate adverse significant effect.

Viewpoint 001.3.021: view east from 106-108 Hampstead Road

- 12.4.54 This viewpoint is representative of views from buildings immediately adjacent to the National Temperance Hospital main compound. The construction works will be visible from the rear of these three and four storey neighbouring properties. The trees in St James's Gardens in the middle and background of the view will be lost, which will open up views of construction activity. Views from the upper floors will be direct and close, towards the construction compound and works to the western edge of Euston station; however views from lower floors will be partially screened by hoardings. The National Temperance Hospital buildings will be demolished and replaced by temporary portable buildings up to six storeys high during the construction works. The loss of key characteristics of the view will result in a high magnitude of change.
- 12.4.55 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.56 At night, continuous lighting is proposed at the National Temperance Hospital main compound. St James's Gardens and surrounding areas are already lit but the dense tree canopy associated with the gardens limits the light spread. The removal of existing trees will open views towards the construction activity and associated lighting. Therefore, the magnitude of change to this receptor at night will be medium, resulting in a moderate adverse significant effect.

Viewpoint 001.2.022: view looking east from the front of Cartmel, Coniston and Newlands residential blocks

- 12.4.57 Close and direct views of both the construction works and the demolition of the BHS Ltd offices and distribution centre will be obtained from these residential blocks, in particular Cartmel which has seven storeys and a new Regent's Park Estate residential block which will have been developed on the eastern side of Newlands. The removal of trees to the east of Cartmel, Newlands and Coniston residential blocks will open up views of the construction works. The close proximity of the construction activity and hoardings associated with the Hampstead Road Bridge replacement works will be prominent in the foreground from the upper floors of the apartment blocks. Newlands residential block is set slightly west of the Granby Terrace overbridge satellite compound and will benefit from some screening provided by existing buildings and

¹⁰³ The southern part of the open space north of Langdale.

vegetation. Cranes will be visible in the middle ground and background above intervening buildings. Views east from Newlands residential block will be largely enclosed by one of the new Regents Park Estate residential blocks, which will replace existing trees at the front of Newlands residential block. Overall, the magnitude of change will be high.

- 12.4.58 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.59 Effects at night will be non-significant in context of existing street lighting and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.6.024: view east from 1 to 9 Melton Street

- 12.4.60 The views from the upper floors of 1 to 9 Melton Street are close and will be direct and open towards construction works. The removal of many of the mature trees in Euston Square Gardens and from an adjacent section of Euston Road, to facilitate the construction of the bus station and Euston Road subway and Euston Square underground connection, will open up views of the construction activity and will remove a key characteristic of the view. Currently, views towards Euston are filtered through the trees. Additionally, the demolition of Grant Thornton House and One Euston Square will open up views eastwards towards Euston station and the main construction site. Melton Street will be closed. Hoardings erected in front of the eastern façade of 1 to 9 Melton Street and surrounding the Euston Square Gardens (west) satellite compound will partially screen some of the construction activity and large-scale construction plant from the street and ground floor level. Overall, the magnitude of change will be high.
- 12.4.61 The high magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 002.3.001: view north from Friends House Gardens and from offices in adjacent buildings

- 12.4.62 The nearest part of the Euston Square Gardens west and east satellite compounds will be located less than 50m from this viewpoint. There will be direct and close views of construction works from Friends House Garden, Friends House and from commercial offices at 161 to 169 Euston Road. The removal of the mature trees in the western part of Euston Square Gardens will substantially change the existing view and increase the prominence of any construction plant in the Euston Square Gardens (west) satellite compound. Trees will be retained where reasonably practicable. In particular, trees along the southern edge of the gardens will be retained, partially filtering views of the satellite compounds to the north. The demolition of the Grant Thornton Building and One Euston Square will open up views of large-scale construction plant and buildings beyond. The lodges will remain but the war memorial will be relocated during the construction phase. Views from the offices are close and elevated (from four to six storeys high) and the construction site will be visible over the busy Euston Road. Overall, this will result in a high magnitude of change.
- 12.4.63 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.

Viewpoint 002.6.002: view north-west from Euston Fire Station

- 12.4.64 There will be direct and close views of construction works from the Euston Fire Station across the busy Eversholt Street. Most trees lining the southern edge of Euston Square Gardens will be retained although other trees within Euston Square Gardens will be removed either for utilities works, to facilitate construction of a surface water attenuation tank, or to accommodate the satellite compounds and a temporary taxi rank. The loss of the mature trees in the gardens will open up views of hoardings, plant and machinery associated with the Euston Square Gardens (east and west) satellite compound in the middle ground. Cranes and other large plant will be visible in the background above intervening buildings. The magnitude of change will be high.
- 12.4.65 The high magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 002.2.007: view west from Eversholt Street, between Phoenix Road and Polygon Road

- 12.4.66 The revised scheme will be located approximately 10m from this viewpoint across the busy Eversholt Street. The removal of street trees resulting either from utility diversion works or the demolition of the existing Royal Mail NW1 delivery office will open views of the Royal Mail NW1 delivery office satellite compound and construction activity on the far side of the railway. It has been assumed that the street trees on the eastern side of the street will be retained. The Royal Mail NW1 delivery office satellite compound and associated hoardings will replace the utilitarian Royal Mail building in the foreground of the view. Temporary portable buildings, up to six storeys high, will be located in the compound. Large plant and cranes will be visible in the background of the view. Overall, the magnitude of change will be medium.
- 12.4.67 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.68 Effects at night will be non-significant and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Viewpoint 002.3.011: view north from Euston Square Gardens

- 12.4.69 The Euston Square Gardens (east and west) satellite compounds will be located adjacent to this viewpoint. The lodges will remain. There will be direct and close views of the construction works from the pedestrian routes across Euston Square Gardens. Views at ground level will be limited by 2.4m high hoarding in the foreground with construction activity associated with the high speed station visible in the middle ground, above the hoardings. The removal of the mature trees in both parts of Euston Square Gardens will substantially change the existing view, increasing the prominence of large construction plant in the satellite construction compounds. The demolition of Grant Thornton House and One Euston Square and resultant opening up of views towards the high speed station construction area will contribute to a high magnitude of change.
- 12.4.70 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.

Viewpoint 002.5.012: view west from Travelodge

- 12.4.71 There will be direct and close views of construction works from the Travelodge across Eversholt Street. Trees lining Eversholt Street and a number within Euston Square Gardens will be removed to facilitate construction activities. The removal of mature trees in the gardens will open up some views of the Euston Square Gardens (east) satellite compound in the middle ground. Other potential views will be screened by the Podium and 1 Eversholt Street. Cranes and other large plant will be visible in the background above intervening buildings. The magnitude of change will be medium.
- 12.4.72 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.73 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 002.2.014: view south and west from apartments on Barnby Street

- 12.4.74 There will be direct and close views of demolition of the existing delivery office building, the presence of new, temporary portable buildings up to six storeys (approximately 20m) high, and construction of a bus turning area and new bus stands. These activities and features will be located within the Royal Mail NW1 delivery office satellite compound. There will also be a taxi rank in Eversholt Street and some street trees on Barnby Street will be removed. There will be oblique background views, largely from upper floors, of the demolition and replacement of Hampstead Road Bridge and the demolition of buildings in Regent's Park Estate and on Hampstead Road. These works will be viewed in the context of the working railway corridor and existing light industrial land use. Overall, the magnitude of change will be medium.
- 12.4.75 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.76 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 002.2.015: view north and west from apartments on Ampt Hill Estate and Barnby Street

- 12.4.77 There will be direct and close views of demolition works and of the A400 Hampstead Road overbridge (south) satellite compound due to the removal of trees in the Ampt Hill Estate, predominantly alongside the railway corridor. There will be oblique views, largely from the upper floors, of the demolition and replacement of Hampstead Road Bridge and the demolition of buildings on Hampstead Road in the background. These works will be viewed in the context of the working railway corridor and existing light industrial land use. Overall, the magnitude of change will be medium. Utilities diversions within the Ampt Hill Estate are likely to result in some loss of existing trees but there is a commitment to reinstate and enhance the communal spaces on completion of the works. Overall the magnitude of change will be medium.
- 12.4.78 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.

- 12.4.79 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.2.001: view east from Augustus Street

- 12.4.80 The revised scheme will be located approximately 80m from this viewpoint. There will be framed views towards the construction activity. In the foreground, they will be partially screened by existing buildings and vegetation. The demolition of the Ainsdale residential block in the middle ground will open up views eastwards towards construction activity, including the demolition and construction works for Hampstead Road Bridge. From upper floors, views of large plant will be evident in the background of the view. Overall, the magnitude of change will be medium.
- 12.4.81 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.82 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.2.002: view east from dwellings on Park Village East (between Granby Terrace and Silsoe House)

- 12.4.83 Works for the revised scheme will be located less than 10m from the dwellings along Park Village East and there will be direct and close views of construction works. The large construction plant required for the carriage shed demolition works will be visible to the rear of the retained parapet wall, planters and associated tree/shrub planting. Views of the utility works and the works associated with Granby Terrace Bridge, the decks over the high speed railway and the emergency access building next to the realigned Granby Terrace Bridge will be close and direct. Overall, the construction activities will be highly visible, large scale and prominent in the foreground and middle ground of the view. Therefore, the magnitude of change will be high.
- 12.4.84 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in major adverse significant effect.
- 12.4.85 Effects at night will be non-significant and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Viewpoint 003.2.009: view east from dwellings on Park Village East (between Silsoe House and Nash House)

- 12.4.86 Works for the revised scheme will be located less than 10m from the dwellings along Park Village East and there will be direct and close views of construction works. The demolition of the carriage shed (to the south) and removal of the parapet wall, planters and associated tree/shrub planting will open up views and large construction plant will be present in the foreground and middle ground of the views. Views of the utility works, the piling works associated with the construction of the retaining wall along Park Village East, construction of the high speed dive under as well as views of the cranes required for the Line X works, the Mornington Street Bridge works, construction of decks over the high speed railway and the Mornington Street Bridge ventilation building will be close and direct. The presence of 2.4m high hoardings will partially screen the construction works from ground level during the phased closure of the road but will be prominent in the foreground of the view. Ground-level views will

also be substantially screened by the phased introduction of 3.6m high noise mitigation hoardings alongside the western edge of Park Village East although these will be present for a relatively short duration. The parapet wall, planters and associated tree and shrub planting will be reinstated at the end of construction Stage A and replacement tree planting will be provided on both sides of the Mornington Street Bridge in Park Village East. Overall, the construction activities will be highly visible, large scale and prominent in the foreground of the view. Therefore, the magnitude of change will be high.

- 12.4.87 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in major adverse significant effect.
- 12.4.88 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.2.010: view looking east from dwellings on Park Village East (between Nash House and Parkway)

- 12.4.89 The revised scheme will be located less than 15m from the dwellings on Park Village East. The existing parapet wall, raised planter and associated tree and shrub planting will be removed, opening up views of the construction activity. There will be direct and close views from the dwellings on Park Village East of the utility works, the piling and other construction activities associated with the retaining wall in the foreground of the view, the construction of the tunnel portal, headhouse and hardstanding, and track works, as well as views of the cranes required for the Line X works. There will be oblique views of the demolition and replacement of Mornington Street Bridge in the middle and background of the view. The 2.4m high hoarding will be prominent in the foreground and will screen the construction works from ground level during the phased closure of the road. Ground level views will also be substantially screened by the phased use of 3.6m high noise mitigation hoardings alongside the western edge of Park Village East although these will be present for a relatively short duration. The parapet wall, planters and associated tree and shrub planting will be reinstated at the end of construction Stage A. Overall, the magnitude of change will be high.
- 12.4.90 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect.
- 12.4.91 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.4.036: view north east from the Outer Circle, Regent’s Park

- 12.4.92 Construction activity associated with the lorry holding area in the ZSL London Zoo coach park will include underground utility diversion works and an extended area of hardstanding as well as the presence of construction plant. The lorry holding area will be surrounded by hoardings and will use the existing ZSL London Zoo coach parking facilities. The works will include an extension to the coach parking area to provide additional car parking spaces, and this, together with the utility works, will result in loss of existing mature trees, thereby opening up views towards the worksite. It is assumed that, upon completion of the works, new hedging will be established around the periphery of the lorry holding area to help integrate the facility into existing views. Some replacement tree planting is also likely to be established around the facility. The

loss of existing trees and an increased intensity of vehicular movements in the park will result in a medium magnitude of change.

- 12.4.93 The medium magnitude of change assessed against the high sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 004.2.004: view west from Dalehead, Gillfoot and Oxenholme apartments

- 12.4.94 The revised scheme will be located adjacent to this viewpoint. There will be close and direct views of construction work in the foreground from Dalehead, Gillfoot and Oxenholme tower blocks. Views from Amptill Estate will be partially screened by adjacent buildings and existing vegetation. This will include views of the Hampstead Road overbridge satellite compounds (north and south) east of the railway cutting which will be prominent in the foreground of the view together with the reconstruction of Hampstead Road Bridge. The construction works will include the removal of the Addison Lee vehicle compound and associated temporary buildings to make space for the Hampstead Road overbridge (north) satellite compound and the removal of some existing trees and shrubs in the Amptill Estate and along Hampstead Road Bridge thereby opening views of the construction activity from the ground level and lower floors. Construction activity associated with the bridge works will be highly visible in the foreground and middle ground of the view, as illustrated on the photomontage shown in Figure LV-01-269 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES). In the background, the demolition of blocks in the Regent's Park Estate will also be visible. Overall, the magnitude of change will be high.
- 12.4.95 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.96 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.2.005: view south-west from Mornington Crescent (numbers 1 to 12) and Hampstead Road (numbers 261 to 263)

- 12.4.97 The revised scheme will be located adjacent to this viewpoint. There will be direct and close views of construction works from the rear of dwellings located on Mornington Crescent. These will include views of the demolition and reconstruction of Granby Terrace Bridge in the middle ground and the demolition of the carriage shed and oblique views of the demolition and reconstruction of Hampstead Road Bridge in the background of the view. The loss of the Addison Lee compound will not represent a substantial change in the view. Views of the rail systems works, the piling works associated with the retaining wall along Park Village East, construction of the high speed dive under as well as views of the cranes required for the Line X works, construction of decks over the high speed railway and associated emergency intervention building next to Granby Terrace Bridge will be obtained within and over the railway corridor. Overall, the construction activities will be highly visible, large scale and prominent in the middle ground of the view. Ground level views will be substantially screened by 3.6m high noise mitigation hoardings, located either along rear garden boundaries or along the parapet wall adjacent to Clarkson Row. Overall, the magnitude of change will be high.

- 12.4.98 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.99 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.2.007: view west from Mornington Terrace

- 12.4.100 The revised scheme will be located across the railway corridor from the dwellings on Mornington Terrace. There will be direct views of construction works including the demolition and replacement of Granby Terrace Bridge and Mornington Street Bridge, the piling and other works associated with the retaining wall on Park Village East, the demolition of the carriage shed in the middle ground and the construction of decks over the high speed dive under structures south of Mornington Street Bridge. The rail systems works will also be visible in the middle ground. There will be oblique views of the construction of the tunnel portal and the demolition and reconstruction of both Granby Terrace Bridge and Hampstead Road Bridge. The parapet wall and street trees on Mornington Terrace will be largely unaffected, with the exception of the wall and trees adjacent to Mornington Street overbridge satellite compound, which will be removed and replaced on completion of the bridge works. Hoardings, 2.4m high, will be present in the foreground of the view from properties close to Mornington Street Bridge for the duration of the bridge works, approximately eight years (this will involve two discrete periods of construction activity between 2016 and 2018 and between 2022 and 2023). Ground-level views will also be substantially enclosed for up to three years by 3.6m high noise mitigation hoardings, located along the parapet wall adjacent to Mornington Terrace. Overall, the magnitude of change will be high.
- 12.4.101 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.102 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.1.008: view west from Mornington Street and Mornington Terrace

- 12.4.103 Views from Mornington Street will be close and direct towards construction works. The Mornington Street overbridge satellite compound will be located less than 10m from this viewpoint. Views of the satellite compound and large-scale construction plant will be possible, albeit against the backdrop of the existing busy railway corridor. Other activity associated with the revised scheme will be located on the opposite side of the railway corridor from the dwellings on Mornington Terrace. There will be direct and oblique views of construction works including the demolition and replacement of Mornington Street Bridge, its pillars and associated lamp posts, the piling associated with the retaining wall on Park Village East, the tunnel portal and the decks over the high speed railway. The parapet wall and street trees on Mornington Terrace will be largely unaffected, with the exception of the wall and trees adjacent to Mornington Street overbridge satellite compound, which will be removed and replaced on completion of the bridge works. Hoardings, 2.4m high, will be present in the foreground of the view from properties close to Mornington Street Bridge for the duration of the bridge works, approximately eight years (this will involve two discrete periods of construction activity between 2016 and 2018 and between 2022 and 2023).

Ground-level views will also be substantially screened for up to three years by 3.6m high noise mitigation hoardings, located along the parapet wall adjacent to Mornington Terrace. Overall, the magnitude of change will be high.

- 12.4.104 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect.
- 12.4.105 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.1.010: view west from the corner of Delancey Street and Mornington Terrace

- 12.4.106 The revised scheme will be located approximately 30m to the south-west of the viewpoint. Views from Mornington Terrace will be partially screened by the existing parapet wall with the majority of the construction activity at a lower level within the railway corridor. Views west from the Edinboro Castle public house and adjacent dwelling, across the railway corridor, will be direct of the tunnel portal and oblique of the retaining wall and dive under / Line X works associated with Park Village East. Views from properties on Delancey Street and the northern end of Mornington Terrace will be partially screened by intervening trees and buildings. The construction plant will be prominent but seen against the backdrop of the existing busy railway corridor. Ground-level views will also be substantially enclosed for up to three years by 3.6m high noise mitigation hoardings, located along the parapet wall adjacent to Mornington Terrace, along the rear boundary of the Edinboro Castle public house and along the rear and side boundaries of the adjacent residential property. Therefore, the magnitude of change will be medium.
- 12.4.107 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.4.108 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Cumulative effects

- 12.4.109 The cumulative effects of committed developments on LCAs and viewpoints are described below.
- 12.4.110 Three large-scale mixed-use schemes in the King's Cross Growth Area and the redevelopment of the former Odeon site and Rosenheim Building site off Tottenham Court Road may give rise to potential cumulative effects as these are likely to be under construction between 2017 and 2026. Although the Kings Cross Growth Area developments will take place in fairly close proximity to the revised scheme, site investigation has indicated that any visibility of construction activity indicated on the ZTV will, in fact, be screened by dense intervening development and vegetation. Similarly, the adjacent buildings surrounding the former Odeon site will screen views of the revised scheme.
- 12.4.111 The combined presence of construction activity and plant from the King's Cross Growth Area developments, the former Odeon site and the construction of the revised scheme will not change the assessment for receptors identified as not significantly affected by the construction of the revised scheme on its own.

Other mitigation measures

- 12.4.112 To further reduce the significant effects described above, consideration of where planting can be established early in the construction programme will be given during the detailed design stage. This may include consideration of early planting in areas released early during construction which will have the additional benefit of providing some visual screening. However, not all landscape and visual effects can be practicably mitigated due to the visibility of construction activity and sensitivity of surrounding receptors.
- 12.4.113 In addition to the mitigation measures incorporated into the draft CoCP, the following other measures will also be implemented:
- replacement tree planting wherever possible in the first planting season following completion of construction works, e.g. along Park Village East and Mornington Terrace;
 - replacement tree planting wherever possible in the first planting season following utility diversion works;
 - use of high-quality hoardings and noise barriers; and
 - provision of active frontages in the phased development associated with the station.

Summary of likely residual significant effects in Stage A construction (2017–2026)

- 12.4.114 Despite the provision of mitigation measures, the temporary residual significant effects during construction remain as described above. However, these effects will be largely temporary in nature lasting only for the duration of the construction works. Any residual effects will generally arise from the widespread visibility of construction activity and construction plant and structures within the landscape and viewed from surrounding residential and commercial properties and visible to users of footways in the study area.

12.5 Effects arising during Stage B1 construction and operation (2026–2033)

- 12.5.1 The assessment of impacts and effects for the Stage B1 construction and operation period incorporates a baseline of elements completed in construction Stage A, including six completed HS2 platforms, concourses and station accommodation buildings which will open as HS2 Phase One in 2026, completed high speed operational elements in the station approach and the ongoing construction associated with the remaining five high speed platforms and high speed station buildings which will allow HS2 Phase Two to open in 2033.
- 12.5.2 Construction activities involving construction of the new high speed station and the presence of large scale plant and machinery, work sites and construction compounds will be the most visually prominent components of the works. Most of the construction works in Stage B1 will take place concurrently for most of the construction programme, thereby contributing to a 'peak construction phase', which has been used to assess potential landscape and visual effects.

- 12.5.3 Construction activity in Stage B1 will be focused on a smaller area as all the works in and alongside the station approach north of Granby Terrace Bridge will have been completed by the end of Stage A. The Stage B1 construction works will be contiguous with the Stage A construction works in the area around Euston station and will, in some cases, result in a continuance of effects on visual receptors affected by the Stage A construction works with the result that the effects of construction works will be experienced for the duration of both Stage A and Stage B1, i.e. for up to 17 years.
- 12.5.4 This section focuses on the most prominent elements of change assessed against a winter baseline which will be:
- temporary construction activities in Stage B1 – assumed peak construction activities, for example, the remainder of the high speed station construction and construction activities associated with the creation of open space, access roads, station entrances and forecourts; and
 - permanent operational features – such as completed built elements of the revised scheme, for example, the re-constructed Mornington Street Bridge, the newly aligned Hampstead Road Bridge and Granby Terrace Bridge, the high speed tunnel portal and dive unders in the station approach, the western side of the high speed station including the western side of the station concourses, the western station roof and buildings fronting the realigned Cobourg Street, housing station accommodation and permanent retail facilities.
- 12.5.5 The assessment of the new high speed station and other permanent works has been based on the illustrative plans and cross-sections shown on Figures CT-20-001, CT-20-002 and CT-20-003, Volume 2 CFA1 Map Book of the SES2 and AP3 ES.
- 12.5.6 The specific elements of the revised scheme that have been taken into account in determining the effects on landscape and visual receptors includes both temporary and permanent effects.
- 12.5.7 Temporary effects arise through the presence of construction activity associated with:
- continued construction of the high speed station and construction of the associated spine building;
 - construction of the linear bus station north of Euston Road, with a bus access from Euston Road at Melton Street. The existing vehicular access through the middle of Euston Square Gardens will be removed and the war memorial and statue of Robert Stephenson relocated;
 - construction of a new taxi rank at the northern entrance to the high speed station (the Hampstead Road station entrance), green space and cycle infrastructure linking to the enhanced cycle route running north to south along the realigned Cobourg Street; and a temporary (2026 to 2033) taxi rank constructed on the realigned Cobourg Street;
 - construction of a southern LU entrance (north of the bus access road, south of high speed station spine building);
 - construction of an escape building at the northern end of the high speed

station and the open green space between the northern station entrance and Hampstead Road Bridge; and

- the presence of construction compounds: the Podium main compound; Euston Square Gardens (east and west) satellite compounds, Euston forecourt satellite compound; Melton Street satellite compound; Cobourg Street satellite compound; National Temperance Hospital main compound; Royal Mail delivery office satellite compound; Granby Terrace overbridge satellite compound; and Hampstead Road overbridge (south) satellite compound.

12.5.8 Permanent effects arise due to the demolition of existing buildings and structures and by the presence of elements of the revised scheme completed in construction Stage A:

- the western half of a new high speed station to the west of the existing conventional station including two and three storey station accommodation and servicing and logistics buildings fronting onto Cobourg Street with a variable roofline that is approximately 40m high at its highest point. The station structures above concourse level are likely to be steel-framed and will include the station facilities and retail areas;
- the Cobourg Street station entrance and associated public realm areas, a new ventilation shaft building and an emergency evacuation building on Cobourg Street, cycle stands and taxi drop off facility;
- the Gordon Street LU entrance building;
- the presence of potential development plots, most of which will be decks above the high speed railway immediately south and north west of the high speed station building and over the high speed dive unders and tracks in the station approach south of Mornington Street Bridge (with 1.8m high parapet walls);
- an emergency evacuation building in Euston Square Gardens;
- the Cobourg Street ventilation shaft building;
- the southern LU entrance building (north of the bus station access road), south of the high speed station but integrated into the high speed station roof and canopy;
- new bus stands and a driver welfare building at the Royal Mail delivery office satellite compound off Eversholt Street north of the conventional station¹⁰⁴;
- an emergency intervention building adjacent to the reconstructed Granby Terrace Bridge;
- a new ventilation building adjacent to the rebuilt Mornington Street Bridge containing the tunnel ventilation and electrical equipment required for the

¹⁰⁴ There will also be modular type construction offices up to six storeys high on this site which will remain until the end of construction Stage B1. The offices will be located over the bus stands with a pedestrian entrance from Eversholt Street. The landscaped open space will not be completed until the end of construction Stage B1.

covered sections of the high speed tracks in the station approach;

- rebuilt Hampstead Road Bridge, Granby Terrace Bridge and Mornington Street Bridge;
- the tunnel portal headhouse building;
- additional cycle parking around the conventional and high speed stations with a main cycle parking facility at the Cobourg Street station entrance; and
- the reconstructed parapet wall and planting along Park Village East.

Avoidance and mitigation measures

12.5.9 Measures that have been incorporated into the draft CoCP that are described for construction Stage A will be the same for construction Stage B1.

12.5.10 A process of iterative design and assessment has been employed to avoid or reduce adverse effects during construction Stage B1. Measures that have been incorporated into the design of the revised scheme completed during Stage A include:

- the retention of buildings of townscape importance, including: 1 to 9 Melton Street; Euston House; 1 Park Village East (the Old Riding School); the York and Albany public house; and 119 to 125 Parkway;
- the creation of a new public space including a MUGA and children's play area and associated planting in the open space north of Langdale;
- replacement of parapet walls, planters and associated vegetation alongside Park Village East with the parapet wall and planter incorporating similar brick detail to the existing walls to respect the setting within the Regent's Park Conservation Area;
- replacement of the Mornington Street Bridge pillars, planter and parapet walls, replicating the existing features;
- improvements to other existing open spaces, within the Ampthill and Regent's Park Estates;
- provision of new tree planting in proposed open spaces and areas of high quality public realm;
- replacement tree planting wherever possible in the first planting season following completion of construction works;
- use of high quality hoardings; and
- provision of active frontages associated with the station.

12.5.11 Design principles that have been adopted by HS2 include the design of public realm to create significant new destinations; link and connect with the wider network of streets and spaces and be an environment where pedestrians are prioritised and enhance both new station development and the existing character of the local area to generate economic, environmental and social benefits and act as a catalyst for future development and area transformation.

- 12.5.12 These design principles and mitigation measures have been taken account of in the assessment of the effects during Stage B1.

Assessment of impacts and effects

- 12.5.13 The likely effects on landscape character and views during Stage B1 relate to the presence of construction activity and continued use of construction compounds as well as the presence and operation of new structures and elements in the landscape including new bridges, ancillary buildings and the high speed station buildings, particularly where these features will be in close proximity to smaller residential scale properties.
- 12.5.14 The assessment takes account of the loss of St James's Gardens during Stage A, and the permanent loss of buildings and widening of the railway corridor in the Regent's Park Estate. This includes an assessment of the changed relationship between the residential blocks and the raised Hampstead Road Bridge (an operational feature) against a background of high speed station construction in Stage B1.
- 12.5.15 The operational features completed in construction Stage A (by the end of 2026) and ongoing construction activities in Stage B1 (between 2026 and 2033) overlap in terms of views and landscape context and, for the most part, are not separable and have, therefore, been discussed in combination.

Landscape assessment

- 12.5.16 This section describes the significant effects on LCAs during Stage B1 of construction and operation of HS2 Phase One. Non-significant effects on LCAs are presented in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Euston Road Commercial Area LCA

- 12.5.17 During construction Stage B1, the construction activity in this LCA will include the presence of the Podium main compound, Euston Square Gardens (east and west) satellite compounds, Euston forecourt satellite compound, Melton Street satellite compound, Cobourg Street satellite compound, and the National Temperance Hospital main compound.
- 12.5.18 Built elements of the revised scheme will comprise the western side of the new high speed station, the realigned Cobourg Street, new western high speed station temporary accommodation buildings, a temporary southern entrance to the high speed station linked to Euston Road and providing access to the conventional station, the new Cobourg Street station entrance and forecourt with associated facilities including the Cobourg Street escape building and taxi drop off. Other features will include the Cobourg Street ventilation building, a new entrance to Euston underground station with links to Euston Square underground station in Gordon Street, an LU and station escape building in Euston Square Gardens and potential development plots over the high speed railway. All of these will form key elements within the LCA.
- 12.5.19 Certain elements of the revised scheme will have a positive impact on the character of parts of this LCA, including:
- presence of high quality public realm linking the main station entrances,

including hard and soft landscaping extending along the realigned Cobourg Street; and

- the provision of active frontages along the western station façade which will be representative of regeneration in the area, creating more pedestrian activity, but also potentially adversely affecting the tranquillity of the local area.

12.5.20 However, these positive elements will also be set in the context of a greater number of more substantial adverse changes within the LCA, including:

- the high speed station, which by 2026 will have created a footprint approximately a third greater than the present Euston station. The maximum height of the high speed station will be around 60m AOD, about 35m to 40m higher than existing street level. Although this will not be completed until the end of construction Stage B1, this height limit will also apply to the western façade of the station and two three-storey buildings along Cobourg Street which will be completed in 2026. The overall footprint of the high speed station will be considerably larger than the surrounding built elements, resulting in the permanent loss of the existing smaller scale street pattern;
- the realignment and widening of Cobourg Street which will be extended north to the A400 Hampstead Road and will include a taxi rank and a segregated cycle way;
- the loss of St James's Gardens and continued use of Euston Square Gardens as construction compounds; and
- a net loss of street trees, removed during construction Stage A and either not replaced or replaced by smaller-growing species of trees in locations where constrained by new underground utilities or structures, or by shallow soil depths associated with new underground structures.

12.5.21 The new station entrance and temporary taxi rank on Cobourg Street will locally alter pedestrian and vehicle movement patterns. There will be a local reduction in tranquillity as a result of construction noise. An increase in pedestrian activity is likely around the station with enhanced vitality of adjacent streets, particularly in the context of the active frontages along the new western station façade.

12.5.22 The Euston Square Gardens (west and east) satellite compounds will continue to be in use during construction Stage B1, so the gardens will not be reinstated until the end of 2033.

12.5.23 The magnitude of change will be high. This high magnitude of change is likely to occur throughout most of construction Stage B1.

12.5.24 The high magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a major adverse significant effect. The magnitude of change when built will be dependent on the final architectural design and the development of a public realm strategy and high-quality landscape design. Implementation of high-quality design proposals will not, however, change the significance of effect.

Euston West Post-War Residential LCA

- 12.5.25 During construction Stage B1, the National Temperance Hospital main compound and Granby Terrace overbridge satellite compound will be active in this LCA.
- 12.5.26 The majority of the LCA is located outside of the extent of the revised scheme with the exception of the Stage B1 works associated with construction of the high speed station and underground station, which will be supported by the Granby Terrace overbridge satellite compound. The relatively dense urban grain and high-rise buildings will limit the effects on the wider LCA. Impacts on landscape character in construction Stage B1 and operation within this LCA are mainly those associated with permanent operational features against a background of construction activities and include:
- the permanent loss of residential and commercial buildings and widening of the railway corridor in the Regent's Park Estate and loss of communal gardens;
 - the changed relationship between the Cartmel and adjacent residential blocks and the reconstructed Hampstead Road Bridge; and
 - the realigned Granby Terrace Bridge, also elevated to align with Hampstead Road Bridge.
- 12.5.27 The loss of existing large-scale commercial buildings along Hampstead Road, the three residential blocks in the Regent's Park Estate and associated established communal gardens and the carriage shed will remove dominant and enclosing elements in the LCA. The raised Hampstead Road Bridge and new 1.8m high parapet wall along the widened railway will create some enclosure during construction Stage B1 but will not be the same scale as the existing built elements, opening views to the north-east.
- 12.5.28 The revised scheme will result in alterations to key characteristics of the LCA, but will be contained to areas adjacent to the railway corridor. Overall, the magnitude of change will be medium. This medium magnitude of change is likely to occur throughout most of construction Stage B1.
- 12.5.29 During Stage B1 construction and operation, the medium magnitude of change, combined with the medium sensitivity of the character area, will result in a moderate adverse significant effect.

Visual assessment

- 12.5.30 This section describes the significant effects on visual receptors during peak construction activity between 2026 and 2033 (construction Stage B1 and operation) when operational features completed in construction Stage A (2017 to 2026) will also be present. Non-significant effects on visual receptors are presented in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.
- 12.5.31 The view of the revised scheme from viewpoint 004.1.008 illustrated in the photomontage shown in Figure LV-01-267 (Volume 2, CFA1 Map Book) of the SES2 and AP3 ES will not be significantly affected following the like-for-like replacement of Mornington Street Bridge.

- 12.5.32 The view of the revised scheme from viewpoint 004.1.010 illustrated in the photomontage shown in Figure LV-01-004 (Volume 2, CFA1 Map Book) of the SES2 and AP3 ES will not be significantly affected by the addition of the portal headhouse, as it will be viewed in the context of the existing railway corridor and is largely characteristic of the existing view.
- 12.5.33 The location of the revised scheme within LVMF views 5A.2 and 6A.1 is illustrated in the photomontages shown in Figures LV-01-001 and LV-01-002 (Volume 2, CFA1 Map Book) of the SES2 and AP3 ES. The revised scheme will not give rise to significant effects on these protected vistas.
- 12.5.34 For each viewpoint the assessment of effects during the winter of peak construction has been undertaken.
- 12.5.35 In most cases, additional lighting will not give rise to significant effects due to the widespread presence of existing lighting in the urban areas. No assessment has been undertaken where there will be no direct foreground visibility of additional lighting or where new lighting would be of a similar nature to existing lighting. Night-time assessments have, however, been undertaken for residential or hotel receptors in areas where the foreground of the view is predominantly unlit and continuous lighting is proposed throughout the night during construction of the revised scheme. Any significant effects at night-time arising from this additional lighting are presented in this section.
- 12.5.36 The viewpoint locations for visual receptors that will be significantly affected as a result of the Stage B1 construction works are identified on Maps LV-03-001 to LV-03-002a (Volume 2, CFA 1 Map Book) of the SES2 and AP3 ES. In each case, the middle number of the reference (xxx.x.xxx) assigned to each visual receptor identifies the type of receptor that is present in this area – 1: Protected views, 2: Residential, 3: Recreational, 4: Transport, 5: Hotels and healthcare institutions, and 6: Employment.
- 12.5.37 Where a viewpoint may represent multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity may be lower than those reported.
- 12.5.38 The level of effect will be dependent on the final architectural and landscape design quality for the built elements and public realm. Implementation of high quality design proposals will not, however, change the significance of effect.

Viewpoint 001.4.002: view north from the corner of Euston Road and Gordon Street

- 12.5.39 The Euston Square Gardens (west), Melton Street and Cobourg Street satellite compounds, the LU and station escape building and construction works for the eastern part of the new high speed station will be visible in the middle ground. Open views towards the station construction works will be possible following the demolition of Grant Thornton House and One Euston Square and the removal of mature trees from Euston Square Gardens and along Euston Road in construction Stage A. Operational features, such as the high speed station accommodation buildings alongside Cobourg Street, will also be visible in northward views along Melton Street. Overall, there will be a high magnitude of change.

- 12.5.40 The high magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 001.6.003: view north-east from 215 Euston Road

- 12.5.41 There will be glimpsed views of the Stage B1 construction works, seen to the side of 1 to 9 Melton Street, from Euston Square Gardens and along Euston Road following the removal of mature trees in construction Stage A. The buildings in the foreground will screen the majority of the construction activity and views from the buildings will be oblique. Cranes and construction activity will be visible from the upper floors but will be a small part of the overall panorama and typical of a central London location. Overall, there will be a medium magnitude of change.
- 12.5.42 The medium magnitude of change assessed against the low sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 001.2.008: view north and east from Cobourg Street

- 12.5.43 The view from the four storey residential properties and the Exmouth Arms public house looking east will be dominated by the completed western high speed station and roof and by the station accommodation buildings alongside Cobourg Street with background views of the Stage B1 construction works to the north and east of these buildings. There will be direct views for pedestrians and vehicle users looking north along Cobourg Street of the National Temperance Hospital main compound due to the demolition of buildings and removal of trees in construction Stage A from St James's Gardens. Therefore, the magnitude of change will be high.
- 12.5.44 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect.
- 12.5.45 The operational station buildings are likely to be lit, glazed and have active frontages. Street lighting will provide additional sources of light and may result in reflection of lighting from glazed facades to adjacent residential properties. The medium magnitude of change at night, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 001.5.011: view east from the Wesley Hotel

- 12.5.46 Following demolition of buildings east of Cobourg Street in construction Stage A, the potential development plots on the western side of the new high speed station will be prominent in the foreground of the view, with an open elevated view possible from upper floors. The construction activity relating to the high speed spine building will be visible in the background of the view, beyond the decks. The removal of the buildings allowing open views of the construction activity represents a major alteration to one of the key characteristics of this view. Overall, the magnitude of change will be high.
- 12.5.47 The high magnitude of change, assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.5.48 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.016: view east from Hampstead Road, near The Tarns and Rydal Water residential blocks

- 12.5.49 The views towards the revised scheme from The Tarns, the proposed replacement housing block on the Hampstead Road frontage and Rydal Water and of pedestrians on Hampstead Road will be close and direct. The opportunities for screening views from this location towards the revised scheme will be limited due to the proximity of the built elements and the lack of available space. However, some replacement tree planting associated with the Cobourg Street station entrance forecourt will be present, having been established at the end of construction Stage A. The hoardings and temporary portable buildings associated with the National Temperance Hospital main compound will be visually prominent. Cranes and activity for the Stage B1 station construction works will be visible to beyond the western station buildings. Views from Rydal Water residential block are likely to be substantially enclosed by the proposed replacement housing block on Hampstead Road frontage, which will replace existing trees in front of Rydal Water. The realigned Hampstead Road Bridge will have increased in height from Robert Street northwards to a height of approximately 2m above existing levels opposite The Tarns block, together with an assumed solid parapet, will be prominent in the foreground of the view. The magnitude of change will be high.
- 12.5.50 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect.
- 12.5.51 Effects at night will be non-significant and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Viewpoint 001.2.020: view north-east from Langdale and Augustus House

- 12.5.52 Views to the north-east will have been opened up following the earlier demolition of buildings in the foreground as part of the Stage A construction works. The northern part of the Granby Terrace overbridge satellite compound, used for the storage of materials, plant and equipment construction in Stage B1, will be prominent in the foreground of the view. The maturing tree and shrub vegetation in the replacement amenity open space, constructed in the area vacated by the southern part of the Granby Terrace overbridge satellite compound at the end of construction Stage A, will also be prominent in some views from Langdale House. The reconstructed and raised Hampstead Road Bridge and Granby Terrace Bridge and the decks over the high speed railway will form notable elements, but will be seen in the context of the existing railway corridor and the backdrop of the existing buildings to the east of the railway corridor. Construction activity may be visible in the background of the view associated with the Hampstead Road overbridge (south) satellite compound. Overall, the magnitude of change will be medium.
- 12.5.53 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.
- 12.5.54 At night, continuous lighting is proposed at the Granby Terrace overbridge satellite compound. The communal gardens are not well lit and the magnitude of change to this receptor at night will be medium, resulting in a moderate adverse significant effect.

Viewpoint 001.3.021: view east from 106-108 Hampstead Road

- 12.5.55 There will be direct and open views from the properties on Hampstead Road across the realigned Cobourg Street and towards the high speed station forecourt and open space associated with the Cobourg Street station entrance, towards the Stage B1 station construction works and the station accommodation buildings fronting Cobourg Street. The station accommodation blocks and western high speed station roof will be the dominating elements in the middle ground of the view. The majority of mature trees in St James's Gardens will have been removed during construction Stage A and the presence of the station accommodation building, the taxi access and drop-off zone and the continued use of the National Temperance Hospital main compound will represent a substantial change to the view. Cranes and construction activity may be visible to the side of the accommodation building in the background of the view. The magnitude of change will be high.
- 12.5.56 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect.
- 12.5.57 At night, continuous lighting is proposed at the National Temperance Hospital main compound. The removal of trees in construction Stage A will have opened up views towards the construction activity and associated lighting. Therefore, the magnitude of change to this receptor at night will be medium. The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 001.2.022: view east from the front of Cartmel, Coniston and Newlands residential blocks

- 12.5.58 The raised Hampstead Road Bridge (approximately 5m above existing levels adjacent to Cartmel, with an assumed solid parapet wall) will be a dominant element in views from the ground floor and first floor flats. This is made more visible by the loss of trees particularly to the east of the Cartmel and Coniston residential blocks. Views from Newlands will be partially screened by the proposed new residential block on the Newlands Plot which will replace existing trees at the front of Newlands. This residential block will be immediately adjacent to the raised Hampstead Road and there will be a substantial change in close proximity to the visual receptor. The six storey temporary buildings in the National Temperance Hospital main compound will enclose most eastward views from Cartmel and from the new residential block on the Newlands Plot. However, cranes and construction activity associated with the Stage B1 station works may be visible from higher floors in the background of the view. The A400 Hampstead Road overbridge (south), Granby Terrace overbridge and Royal Mail delivery office satellite compounds will also be visible. Therefore, the magnitude of change will be high.
- 12.5.59 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect.
- 12.5.60 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.6.024: view east from 1-9 Melton Street

- 12.5.61 The demolition of Grant Thornton House and One Euston Square and the removal of the mature trees in Euston Square Gardens and along Euston Road in construction Stage A will have opened up views of the Stage B1 construction activities and will have removed a key characteristic of the view. The Euston Square Gardens (east and west) satellite compound hoardings will partially screen some of the construction activity and large-scale construction plant from the street and ground-floor level. The potential development plots on the south-western corner of the new high speed station will allow open views across to the spine building construction works in the middle ground of the view. Overall, the magnitude of change will be high.
- 12.5.62 The high magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 002.3.001: view north from Friends House Gardens and offices in adjacent buildings

- 12.5.63 The removal of mature trees from Euston Square Gardens and the removal of Grant Thornton House and One Euston Square as part of the Stage A works will have opened up some views to the on-going station construction works in the middle ground and back ground of the view, although views will be partly filtered by retained trees along the southern boundary of Euston Square Gardens. The Melton Street, Cobourg Street and Euston Square Gardens (east and west) satellite compounds will still be active during this period and both hoardings and construction activity will be clearly visible across the available views, particularly in views from upper floors. The magnitude of change will be medium.
- 12.5.64 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 002.6.002: view north-west from Euston Fire Station

- 12.5.65 There will be direct and close views of Stage B1 works from the Euston Fire Station across the busy Eversholt Street. The removal of mature trees in Euston Square Gardens as part of the Stage A works will have opened up views of the Euston Square Gardens (east and west) satellite compounds in the middle ground. Cranes and other large plant for the Stage B1 construction will be visible in the background over the retained Podium building. The magnitude of change will be medium.
- 12.5.66 The medium magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 002.3.011: view north from Euston Square Gardens

- 12.5.67 There will be direct views of the Euston Square Gardens (east and west) satellite compounds, the bus station and the LU and station escape building in the foreground, and the Euston forecourt and Melton Street satellite compounds in the middle ground. Construction of the high speed station spine building will be in the background of the view alongside the completed station accommodation buildings fronting Cobourg Street. To the west, views of the Grade II* listed 1-9 Melton Street building will be open due to the removal of the office blocks on the conventional station forecourt and trees within Euston Square Gardens in Stage A. The presence of

the 2.4m high hoarding and construction activity will be prominent in the view emphasised by the removal of existing trees. The magnitude of change will be high.

- 12.5.68 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect.

Viewpoint 002.5.012: view west from Travelodge

- 12.5.69 There will be direct and close views of construction works from the Travelodge across the busy Eversholt Street. The loss of mature trees in Euston Square Gardens during construction Stage A will have opened up views of the Euston Square Gardens (east and west) satellite compounds in the middle ground. Other potential views will be partially screened by the Podium and One Eversholt Street. Cranes and other large plant associated with the Stage B1 high speed station works will be visible in the background over the retained parts of the conventional station. Therefore, the magnitude of change will be medium.

- 12.5.70 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect.

- 12.5.71 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.2.002: view east from Park Village East (between Granby Terrace and Silsoe House)

- 12.5.72 The Granby Terrace overbridge satellite compound will be in the foreground and the A400 Hampstead Road overbridge (south) satellite compound will be visible in the middle ground of oblique views over the railway corridor. The emergency intervention building and decks covering the high speed tracks will be visible over the retained parapet wall and associated planting. Overall, the construction activities will be highly visible, but seen in the context of the existing railway corridor. Therefore, the magnitude of change will be medium.

- 12.5.73 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in moderate adverse significant effect.

- 12.5.74 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.4.036: View north east from Regent's Park, Outer Circle

- 12.5.75 Trees lost in construction Stage A will allow open views towards the lorry holding area and replacement coach park. Views will be screened by high quality hoardings and immature hedging, on the periphery of the coach park that will have been established upon completion of the lorry holding area/replacement parking works. Replacement tree planting, established in construction Stage A, will still be immature at this stage. The reduced amount of tree cover, the lorry holding area and associated hoardings and an increased intensity of vehicular movements in the park will result in a medium magnitude of change.

- 12.5.76 The medium magnitude of change assessed against the high sensitivity of the receptor will result in a moderate adverse significant effect.

Viewpoint 003.2.009: view east from dwellings on Park Village East (between Silsoe House and Nash House)

- 12.5.77 Construction activity associated with Granby Terrace overbridge satellite compound may be visible in oblique views. The reconstructed parapet wall and planter will be prominent in direct views from the residential properties. The decks (with 1.8m high parapet walls) over the high speed tracks will be visible together with the associated Mornington Street Bridge ventilation building over the parapet wall. The proposed planting will not be sufficiently mature until the end of Stage B1 construction to re-create the stature of the existing planting. It has been assumed that the parapet wall and planter will incorporate similar brick detail to the existing walls to respect the setting within the Regent’s Park Conservation Area. The Mornington Street Bridge pillars and associated lamp posts, planter and parapet walls will have been replaced, replicating the existing features. The ventilation building will be partly visible over the parapet wall, but seen in the context of the existing railway corridor. The planting will be immature. Overall, the magnitude of change will be low.
- 12.5.78 The low magnitude of change, assessed alongside the high sensitivity of the receptor will result in moderate adverse significant effect.
- 12.5.79 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 003.2.010: view looking east from dwellings on Park Village East (between Nash House and Parkway)

- 12.5.80 The reconstructed parapet wall, security gates and planter will be prominent in direct views from the residential properties. The top of the portal headhouse will be visible above the parapet wall. From the upper floors, the portal headhouse will be visible over the parapet wall. The proposed planting will not be sufficiently established until the end of construction Stage B1 to recreate the stature of the existing planting. It has been assumed that the parapet wall and planter will incorporate similar brick detail to the existing walls to respect the setting within the Regent’s Park Conservation Area. The planting will be immature in construction Stage B1. From upper floors glimpsed views of the tunnel portal will be possible. However, this will be seen in the context of existing elements in the railway corridor. Overall, the magnitude of change will be low.
- 12.5.81 The view of the revised scheme from this location in 2026 is illustrated on the photomontage shown in Figure LV-01-003 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES).
- 12.5.82 The low magnitude of change, assessed alongside the high sensitivity of the receptor will result in moderate adverse significant effect.
- 12.5.83 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.2.004: view west from Dalehead, Gillfoot and Oxenholme

- 12.5.84 The completed replacement Hampstead Road and Granby Terrace bridges will be seen in the context of the existing and widened railway corridor in the middle ground of the view. The Hampstead Road overbridge (south) satellite compound will be in the

foreground of the view and the Granby Terrace overbridge satellite compound will be visible over the railway corridor in the middle ground of the view. The remaining residential blocks of the Regent's Park Estate and some of the properties at the southern end of Park Village East will be visible in the background. The loss of trees adjacent to Hampstead Road Bridge in the communal gardens will allow open views to the roads beyond and replacement planting will be immature in construction Stage B1. Therefore, the magnitude of change will be medium.

- 12.5.85 The view of the replacement Hampstead Road Bridge from this location in 2026 is illustrated on the photomontage shown in Figure LV-01-005 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES). The photomontage has been prepared from the closest location possible to the residences taking into account the raised elevation of the bridge and adjacent sections of Hampstead Road (which will place the representative viewpoint location partially underground if shown in a photomontage). Therefore the photography for this photomontage has been taken at 1.95m high above the viewpoint location to reflect the change in levels resulting from the revised scheme.
- 12.5.86 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.
- 12.5.87 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.2.005: view south-west from Mornington Crescent (numbers 1 to 12) and Hampstead Road (numbers 261-263)

- 12.5.88 There will be close and direct views of the reconstructed and realigned Granby Terrace Bridge in the foreground and the Granby Terrace overbridge satellite compound in the middle ground of the view, beyond which to the south there will be oblique views of Hampstead Road Bridge. The widened railway corridor will cross the length of the view. The removal of the carriage shed and the presence of the decks over the high speed tracks south of Mornington Street Bridge (with 1.8m high parapet walls) and the emergency intervention building will represent a change but will be largely characteristic of the existing view as will the loss of three residential blocks in the Regent's Park Estate. Langdale, Augustus House and Cubitt Court (100 Park Village East) will form the background of the view screening the majority of views of the Regent's Park Estate beyond. The overall magnitude of change will be medium.
- 12.5.89 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.
- 12.5.90 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.2.007: view west from Mornington Terrace

- 12.5.91 Construction activity associated with Granby Terrace overbridge satellite compound may be visible in oblique views. The reconstructed Park Village East retaining wall will be visible over the Mornington Terrace parapet wall. The Mornington Street Bridge will have been replaced. The Mornington Street Bridge ventilation building will also be visible over the parapet wall from some properties, but and will be seen in the context of the existing railway corridor. Replacement street tree planting on Mornington

Terrace near the bridge will be immature in construction Stage B1. Overall, the magnitude of change will be low.

- 12.5.92 The low magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse significant effect.
- 12.5.93 Effects at night will be non-significant and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Other mitigation measures

- 12.5.94 To further reduce the significant effects of Stage B1 construction described above, a review of where planting can be established early in the construction programme will be undertaken during the detailed design stage. This may include consideration of early planting in areas released early during construction which will have the additional benefit of providing some visual screening. However, not all landscape and visual effects can be practicably mitigated due to the visibility of construction activities and the sensitivity of surrounding receptors.
- 12.5.95 The permanent effects of the Stage B1 operation on landscape and visual receptors have been substantially reduced through incorporation of the measures described at the beginning of this section. This measure will provide additional screening and greater integration of the revised scheme into the landscape and will be considered during the detailed design stage.
- 12.5.96 High-quality architectural and landscape design will deliver many enhancements to the new high speed station frontages and entrances and associated soft landscaping.

Summary of likely residual significant effects in Stage B1 construction and operation (2026–2033)

- 12.5.97 Despite the provision of mitigation measures, the temporary residual significant effects during Stage B1 construction and operation remain as described previously. However, these effects will be largely temporary in nature lasting only for the duration of the construction works. Any residual effects will generally arise from the visibility of construction activity and construction plant and structures within the landscape and where viewed from surrounding residential and commercial properties or visible to users of footpaths in the study area.

12.6 Effects arising during operation (2033 onwards)

- 12.6.1 The specific elements of the completed revised scheme that have been taken into account in determining the effects on landscape and visual receptors:
- a new high speed station building incorporating a spine building up to about 35m to 40m above existing street levels, offices and welfare facilities for high speed station and high speed train operations staff. These will be located within the new high speed station spine building (located above the platform-level circulation areas). Plant rooms for heating and ventilation equipment, information technology and telecommunications equipment and electrical switch rooms will also be located at each level as well as in the service and logistics basement. The concourses will be at ground level to facilitate easy access and pedestrian permeability for the Euston area;

- a new pedestrian street running north-south across the high speed station concourses and the deck above the high speed platforms;
- the bus station, north of Euston Square Gardens will be reconfigured as a two-way, linear bus station extending from Melton Street to Eversholt Street. The existing access for eastbound buses from the A501 Euston Road will be closed and moved to Melton Street;
- a new main taxi rank at the northern entrance to the high speed station which will provide for pick up and set down and will be accessed from the A400 Hampstead Road at the northern end of Cobourg Street;
- Euston Road station forecourt will provide the central axis and main southern route to the high speed station and will also provide access to the conventional station via the existing piazza. The forecourt will include areas of hard and soft landscaping in raised planters and will no longer be dominated by Grant Thornton House and One Euston Square, which will be demolished in construction Stage A;
- a forecourt will be located at the northern high speed station entrance (Hampstead Road station entrance) adjacent to the new main taxi rank. The forecourt will include both hard and soft landscaping. A large triangular area of public open space will be provided adjacent to the taxi facilities and there will also be car parking predominantly for train operating company staff in a car park located beneath the deck;
- there will be a western high speed station entrance at the northern end of Cobourg Street. This station entrance will be linked to the Cobourg Street station forecourt. This forecourt will incorporate provision for passenger drop off from private vehicles, cycle paths, cycle parking and the Cobourg Street emergency evacuation building with some landscaped open space;
- Euston Square Gardens will be reinstated and unified by moving the bus station access to Melton Street instead of the current location between the lodges, where it effectively bisects the gardens. Broadly, there will be a balance achieved between the area of soft landscaping removed and that gained from removing the existing bus access¹⁰⁵. Pedestrian routes through the gardens will be realigned. The linear bus station will allow pedestrians to cross easily at surface level from Euston Square Gardens and Euston Road onto the southern station forecourt;
- an LU and station escape building in Euston Square Gardens;
- new public open space at the northern end of the Regent's Park Estate, between the railway and Langdale. It will incorporate land that is at present part of Hampstead Road Open Space, Eskdale play area and other land on the Regent's Park Estate. The space will include grass, planting, children's play areas and a MUGA;

¹⁰⁵ It has been assumed that Euston Square Gardens will be reinstated incorporating high quality public realm in line with the HS2 design standards.

- primary pedestrian routes such as Drummond Street, Cobourg Street and the approaches from Hampstead Road and Euston Road, will incorporate planting as part of a holistic public realm and landscape strategy. Tree planting size will be limited and in raised planters where this is on a deck above the station;
- the permanent loss of mature trees and public open space at St James's Gardens;
- public realm associated with the southern approach to the high speed station and LU entrances;
- the realignment and widening of Cobourg Street, to incorporate a north-south cycle route, cycle parking and areas of public realm;
- decks with 1.8m high concrete parapets over the new high speed railway south of Mornington Street Bridge;
- the Cobourg Street ventilation shaft building;
- bus stands, a driver welfare building and adjacent open green space at the Barnby Street bus stands off Eversholt Street;
- an emergency intervention building adjacent to the reconstructed Granby Terrace Bridge;
- new ventilation building adjacent to the rebuilt Mornington Street Bridge;
- rebuilt Hampstead Road Bridge, Granby Terrace Bridge and Mornington Street Bridge;
- the tunnel portal headhouse building, a multi-storey structure, with the main structure below street level;
- additional cycle parking around the conventional and high speed stations with a main cycle parking facility at the Cobourg Street station entrance; and
- the reconstructed parapet wall and planting along Park Village East.

12.6.2 The assessment of the new high speed station and other permanent works has been based on the illustrative plans and cross-sections shown on Figures CT-20-001, CT-20-002 and CT-20-003, Volume 2 CFA1 Map Book of the SES2 and AP3 ES.

Avoidance and mitigation measures

12.6.3 The operational assessment of impacts and effects is based on year 1 (2033), year 15 (2048) and year 60 (2093) of the revised scheme. Measures that will be incorporated into the design of the revised scheme include a process of iterative design and assessment which has been employed to avoid or reduce adverse effects during operation of the revised scheme. Measures that will be incorporated into the design of the revised scheme include:

- the retention of buildings, including 1 to 9 Melton Street, Euston House, One Eversholt Street, the Podium, 1 Park Village East (the Old Riding School), the York and Albany public house and 119 to 125 Parkway;

- the introduction of a new public space including a MUGA and children's play area and associated planting north of Langdale, as part of the mitigation for the partial loss of St James's Gardens;
- the creation of a public space at the northern entrance to the high speed station, incorporating pedestrian and cycle facilities, green space and planting;
- new areas of tree and shrub planting associated with the bus station proposed at the Eversholt Street/Barnby Street junction;
- the replacement of parapets with appropriate brick finishes, and reinstatement of planting along Park Village East;
- the reinstatement of Euston Square Gardens and the replacement of trees along Euston Road; and
- the replacement of trees, wherever feasible, in streets surrounding the station following the completion of utility diversion works.

12.6.4 These measures have been taken account of in the assessment of the operational effects.

Assessment of impacts and effects

Landscape assessment

12.6.5 The likely effects on landscape character and views during operation of the revised scheme relate to the presence of new structures and elements in the landscape including:

- the presence of the high speed station alongside the remaining conventional station, particularly where it will be in close proximity to smaller residential scale properties;
- the permanent loss of St James's Gardens which will be replaced by other forms of public realm which are more fragmented;
- the permanent loss of buildings and widening of the railway corridor in the Regent's Park Estate; and
- the changed relationship between the existing and new residential blocks and the raised Hampstead Road Bridge.

12.6.6 This section describes the significant effects on LCAs during year 1 and year 15. Year 60 is addressed where areas of planting are proposed. It should be noted that the future development of the OSD plots may well be realised before this date and the surrounding townscape is likely to change considerably given the central London location. Non-significant effects on LCAs are presented in Volume 5 SES2 and AP3 ES Appendix LV-001-001, Part 4.

Euston Road Commercial Area LCA

12.6.7 Within this LCA, the revised scheme will comprise the realignment of Cobourg Street, the high speed station and modified conventional stations, restored Euston Square Gardens, and the new Cobourg Street station entrance and forecourt. Other features

will include the Cobourg Street ventilation shaft building and Cobourg Street escape building, and a new LU entrance north of Euston Square Gardens as well as a new LU entrance in Gordon Street with connections to Euston Square underground station. All of these will form key elements within the LCA.

12.6.8 Certain elements of the revised scheme will have a positive impact on the character of parts of this LCA, including:

- the revised scheme includes public realm improvements and reinstatement, including the main entrance forecourt south of the station and a partly landscaped public forecourt at the Cobourg Street station entrance;
- improved accessibility of the station forecourt achieved by removing steps and barriers to allow better pedestrian circulation and wayfinding;
- creation of pedestrian access routes linking across to Euston Square Gardens;
- provision of new north-south and east-west pedestrian links through the high speed station;
- the restoration of Euston Square Gardens, including replacement tree planting and associated public realm improvements. The relocation of the bus access to Melton Street will also unite the gardens into a single space; and
- the provision of active frontages along the western station façade, which will be representative of regeneration in the area, creating more pedestrian activity but also potentially adversely affecting the tranquillity of the local area.

12.6.9 However, these positive elements will also be set in the context of other substantial changes within the LCA which will have a more notable effect on the character of the area, including:

- the permanent loss of buildings, including Grant Thornton House and One Euston Square; and
- the addition of the new high speed station to the overall station facilities at Euston, which will result in an increase in the footprint of station facilities at Euston by approximately a third compared to the existing conventional station. The three storey high speed station accommodation buildings used temporarily during construction Stage A and parts of construction Stage B1 on the Cobourg Street frontage will provide the base levels to potential OSD. The overall scale of the combined station facilities at Euston will be considerably larger than the surrounding built elements, resulting in the:
 - loss of the existing smaller scale street pattern;
 - permanent loss of St James's Gardens; and
 - permanent loss of street trees along Melton Street and Cardington Street.

12.6.10 Overall, some parts of the character of this area will be improved and the revised scheme will result in the introduction of prominent new elements into the LCA. The presence of the high speed station will alter the pedestrian and vehicle movement

patterns locally through the presence of the entrances along the western façade and the east-west pedestrian links in front of the two stations. There will be a local reduction in tranquillity of the LCA as a result of the increase in pedestrian activity and cycles along Cobourg Street.

- 12.6.11 The restoration of Euston Square Gardens will offer the opportunity to unite the two halves of the gardens and enhance the setting of the lodges with pedestrian links to the station entrance. However, replacement tree planting will not be of sufficient stature in year 1 to replicate the existing trees.
- 12.6.12 Overall, on the basis of the current level of detail developed for the design proposals, the magnitude of change will be medium. The medium magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a moderate adverse significant effect in year 1 of operation. While the implementation of high quality design proposals will reduce the magnitude of change, it will remain at moderate adverse significant effect.
- 12.6.13 By year 15 and year 60, the maturity of planting established as part of the revised scheme will result in greater landscape integration. However, the permanent loss of the majority of St James's Gardens and the provision of relatively fragmented replacement open space will remain. Therefore the overall effect will remain at moderate adverse significant effect.

Euston West Post-War Residential LCA

- 12.6.14 The majority of the LCA is located outside of the extent of the revised scheme and the relatively dense urban grain and high rise buildings will limit the effects on the wider LCA. Impacts on landscape character in year 1 of operation within this LCA will include:
- the permanent loss of residential and commercial buildings in the Regent's Park Estate and loss of communal gardens;
 - the changed relationship between Cartmel, the replacement block in front of Newlands and the reconstructed and elevated Hampstead Road Bridge;
 - the permanent loss of some street trees;
 - the realigned Granby Terrace Bridge;
 - public realm improvements such as the new open space to the north of the station, incorporating areas of hardstanding, open green space and some tree planting and the introduction of the proposed open space, north of Langdale, with children's play areas and associated planting; and
 - other features will include an escape building to the north of the high speed station.
- 12.6.15 The loss of existing large-scale commercial buildings along Hampstead Road, the residential blocks Silverdale, Ainsdale and Eskdale in the Regent's Park Estate, together with Granby House and Stalbridge House, and the associated established communal gardens will remove dominant and enclosing elements in the LCA. The raised Hampstead Road Bridge, new parapet walls along the widened railway corridor

and new and replacement tree planting associated with the open space north of Langdale and communal gardens will provide limited enclosure in year 1.

- 12.6.16 The revised scheme will result in alterations to key characteristics of the LCA, but will be contained to areas adjacent to the railway corridor. Overall, the magnitude of change will be medium.
- 12.6.17 In year 1 of operation the medium magnitude of change, combined with the medium sensitivity of the character area, will result in a moderate adverse significant effect.
- 12.6.18 By year 15 and year 60 of operation, the maturity of planting established along streets and as part of the revised scheme in the open space north of the station, north of Langdale and in the communal gardens, in particular, will result in greater landscape integration and reduce effects to be minor adverse. These are reported in SES and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Visual assessment

- 12.6.19 This section describes the significant effects on visual receptors during year 1, year 15 and year 60 of operation where there are areas of proposed tree planting. Non-significant effects on visual receptors are presented in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.
- 12.6.20 The view of the revised scheme from viewpoint 004.1.008 illustrated in the photomontage shown in Figure LV-01-267 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES) will not be significantly affected due to the like-for-like replacement of Mornington Street Bridge.
- 12.6.21 The view of the revised scheme from viewpoint 004.1.010 illustrated in the photomontage shown in Figure LV-01-004 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES) will not be significantly affected by the addition of the portal headhouse, as it will be viewed in the context of the existing railway corridor and is largely characteristic of the existing view from a receptor. The location of the revised scheme within LVMF views 5A.2 and 6A.1 is illustrated in the photomontages shown in Figures LV-01-001 and LV-01-002 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES). The revised scheme will not give rise to significant effects on these protected vistas.
- 12.6.22 For each viewpoint the following assessments have been undertaken:
- effects during winter of year 1 of operation (2033);
 - effects during summer of year 1 of operation (2034);
 - effects during summer of year 15 of operation (2049); and
 - effects during year 60 of operation (2093).
- 12.6.23 Detailed lighting designs for the operation of the revised scheme have not yet been prepared. However, it is assumed that lighting of the high speed railway north of the station building will be beneath the open space that will cover the new high speed railway up to Hampstead Road Bridge and decks that will be over the high speed railway between Granby Terrace Bridge and Mornington Street Bridge. Elsewhere In the station approach, the lighting regime will remain similar to the existing design. The bus stands off Eversholt Street, northern high speed station entrance and taxi

rank (north of the high speed station) and the Cobourg Street station entrance and forecourt will require street lighting.

- 12.6.24 In most cases, additional lighting will not give rise to significant effects due to the widespread presence of existing lighting in the urban areas. No assessment has been undertaken where there will be no direct foreground visibility of additional lighting or where new lighting would be of a similar nature to existing lighting. Night time assessments have, however, been undertaken for residential or hotel receptors in areas where the foreground of the view is predominantly unlit and continuous lighting is proposed throughout the night. Any significant effects at night-time, arising from this additional lighting at night are presented in this section.
- 12.6.25 The viewpoint locations for visual receptors that will be significantly affected as a result of the operational works are identified on Map LV-04-001 to LV-04-002a (Volume 2, CFA 1 Map Book of the SES2 and AP3 ES). In each case, the middle number of the reference (xxx.x.xxx) assigned to each visual receptor identifies the type of receptor that is present in this area – 1: Protected views, 2: Residential, 3: Recreational, 4: Transport, 5: Hotels and healthcare institutions, and 6: Employment.
- 12.6.26 Where a viewpoint may represent multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity may be lower than those reported.
- 12.6.27 The magnitude of landscape and visual change will be dependent on the final architectural and landscape design quality for the built elements and public realm and may be less than that described although the identified levels of significance of effect are unlikely to change.
- 12.6.28 The assessment of visual effects includes consideration of the overall balance between adverse (e.g. increased height of buildings in the middle ground) and beneficial (e.g. new areas of high quality public realm in the foreground) components of the revised scheme.
- 12.6.29 Potential future OSD has not been included in this assessment because it is not part of the revised scheme. The predicted future views assume that the development plots will have been provided as part of the revised scheme.

Viewpoint 001.4.002: view north from the corner of Euston Road and Gordon Street

- 12.6.30 The demolition of Grant Thornton House and One Euston Square during construction Stage A will provide opportunities for views towards the new high speed station and adjacent conventional station in the middle ground of the view. Views along the tree-lined Melton Street will be replaced by views of the decks at the south-western corner of the high speed station to the north-west of Euston Square Gardens. Newly planted trees in the restored Euston Square Gardens will partially filter some views of the new high speed station. There will be a reduction in the number of mature trees in the existing view as a result of tree removal during construction, thereby opening up views towards the decks, the southern end of the high speed station and LU escape building and cycle stands in Euston Square Gardens. These new elements will be highly visible and views will generally not be softened or screened until partial

maturity of the replacement tree planting. Therefore, the magnitude of change will be high.

- 12.6.31 The high magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.
- 12.6.32 In summer of year 1 of operation, while the existing intervening vegetation will provide some additional screening, the magnitude of change will remain high with no change to the overall significance of effect.
- 12.6.33 By year 15 and year 60 of operation, the replacement tree planting within Euston Square Gardens will have partially matured, providing some additional screening. However, the expanded station and development plots will still be prominent features in the view. Therefore, the significance of effects will remain unchanged.

Viewpoint 001.2.008: view north and east from Cobourg Street

- 12.6.34 The view from the four storey residential properties and the Exmouth Arms public house looking directly east will be dominated by the station accommodation buildings alongside Cobourg Street and the completed high speed station spine building in the background of the view. Views from street level looking directly north along Cobourg Street will remain framed along the western side by existing buildings, along the eastern side by the new high speed station buildings and will include an area of green space at the northern end of the street. The station accommodation buildings will include some retail elements opposite the residential properties along a widened Cobourg Street, which will accommodate taxi and local access, a cycleway and linked areas of public realm. Replacement tree planting will be limited to relatively small species of trees, some of which may be established in raised planters, as soil depth will be restricted by the presence of shallow underground structures and utilities. Overall, the magnitude of change will be high.
- 12.6.35 The high magnitude of change, assessed alongside the high sensitivity of the receptor will result in a major adverse significant effect in the winter of year 1 of operation.
- 12.6.36 In summer of year 1 of operation, the magnitude of change and significance of effect will remain unchanged.
- 12.6.37 By year 15 and year 60 of operation, trees in the northern green space will not be fully mature and the high speed station will still be a prominent feature in the view. Therefore, the significance of effect will remain unchanged.
- 12.6.38 The operational station buildings are likely to be lit, glazed and have active frontages. Street lighting will provide additional sources of light and may result in reflection of lighting from glazed facades to adjacent residential properties. The medium magnitude of change at night, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect.

Viewpoint 001.5.011: view east from the Wesley Hotel

- 12.6.39 The demolition of buildings east of Cobourg Street in construction Stage A will have opened up eastward views. Open elevated views towards and over the development plots on the south western corner of the station will be possible from upper floors. The new high speed station will be visible in the background of the views on the far side of the development plots. The removal of the buildings and resultant opening up of

views of the deck represents an alteration to one of the key characteristics of this view. Overall, there will be a medium magnitude of change.

- 12.6.40 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor will result in a moderate adverse significant effect in both winter and summer of year 1.
- 12.6.41 The significance of effect in year 15 and year 60 will remain unchanged due to the lack of intervening buildings or vegetation.
- 12.6.42 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.016: view east from Hampstead Road, near The Tarns and Rydal Water residential blocks

- 12.6.43 The views towards the revised scheme from The Tarns; the proposed LBC replacement residential blocks in front of Newlands and Rydal Water and from footpaths on Hampstead Road will be close and direct. Replacement tree planting in communal gardens west of Hampstead Road and proposed trees associated with both the Cobourg Street entrance forecourt and the area of greenspace on the northern side of the taxi rank at the northern high speed station entrance will be present. Some existing near distance views of tall buildings on the eastern edge of Hampstead Road will be replaced by relatively open views of public realm at the northern end of the high speed station, with a resultant overall visual enhancement. The built elements associated with the revised scheme will be largely in scale with existing buildings in the view but will not front directly onto Hampstead Road allowing more open views from the properties across the decks over the new high speed railway. The realigned Hampstead Road Bridge will increase in height from Robert Street northwards to a height of approximately 1.3m above existing levels opposite the northern end of The Tarns which together with a solid parapet wall will be a prominent element in the foreground of the view. The magnitude of change will be high.
- 12.6.44 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect in the winter of year 1 of operation.
- 12.6.45 In summer of year 1 and in years 15 and 60 of operation, the significance of effects will be unchanged due to the limited planting between the elements of the revised scheme and the viewpoint.
- 12.6.46 Effects at night will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 001.2.020: view north-east from Langdale and Augustus House

- 12.6.47 The loss of buildings as part of the construction Stage A works will have opened up views of the revised scheme in the foreground alongside the existing railway. The reconstructed Hampstead Road Bridge and Granby Terrace Bridge will form notable elements in the view, but will be seen in the context of the existing railway corridor. The new parapet walls along the edge of the railway corridor will filter ground-level views towards the railway, obtained across the replacement open space north of Langdale, and these views will also be filtered in places by retained and replacement

trees. Elevated views of the railway corridor, including tracks, bridges and the decks over the new high speed railway south of Mornington Street Bridge, will be possible from the upper floors of Langdale and other residential blocks, all seen against a backdrop of the existing buildings to the east of the railway corridor. Oblique views of the new high speed station, seen alongside the existing station, are also likely from some of these residential blocks. Replacement amenity open space will be constructed in the area vacated by the northern part of the Granby Terrace overbridge satellite compound at the end of construction Stage B1 and will be prominent in northward views from Langdale with the backdrop provided by the reconstructed Granby Terrace Bridge. Therefore, the magnitude of change will be medium.

- 12.6.48 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.
- 12.6.49 In winter and summer of year 1 of operation, whilst existing vegetation will provide some additional screening, the new planting will be relatively immature. The magnitude of change will remain medium and the significance of overall effect will remain unchanged.
- 12.6.50 Year 15 and year 60 effects are reduced to non-significant due to the maturity of replacement planting further screening views and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001 Part 4.

Viewpoint 001.3.021: view east 106-108 Hampstead Road

- 12.6.51 There will be direct and open views from these properties, across the new area of open green space, the realigned Cobourg Street and the Cobourg Street station entrance forecourt. The high speed station accommodation buildings and station roof will be prominent in the middle ground of the view with the spine building creating a dominant backdrop. Views will include two potential development plots adjacent to the north-western corner of the station. The presence of the high speed station buildings and the Cobourg Street escape building, the permanent loss of mature trees in St James’s Gardens and replacement tree planting east of the escape building will represent a substantial change to the view. The magnitude of change will be high.
- 12.6.52 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect in the winter of year 1 of operation.
- 12.6.53 In summer of year 1 of operation, effects will be unchanged due to the low height of the proposed planting east of the Cobourg Street escape building.
- 12.6.54 By year 15 and 60 of operation, although proposed planting will have matured, providing some screening, but the elements of the revised scheme will remain the dominant components of the view. Therefore the significance of effect will be unchanged.
- 12.6.55 At night, continuous lighting associated with the Cobourg Street station entrance, taxi drop off and cycle stands will be visible from this viewpoint and nearby properties, with visibility increased due to removal of mature trees from St James’s Gardens. The magnitude of change to this receptor at night will be medium. The medium

magnitude of change, assessed alongside the high sensitivity of the receptor, results in a moderate adverse significant effect.

Viewpoint 001.2.022: view east from the front of Cartmel, Coniston and Newlands residential blocks

- 12.6.56 The raised Hampstead Road Bridge (approximately 5m above existing levels) adjacent to Cartmel, with a solid parapet wall) will be a dominant element in the view from the ground floor flats, which will be made more visible by the loss of trees, particularly to the east of the Cartmel and Coniston residential blocks. Views from Newlands will be partially screened by the proposed new residential block on the Newlands plot, which will replace existing trees at the front of Newlands. This residential block will be immediately adjacent to the raised Hampstead Road Bridge. Views eastwards from the upper storeys will be relatively open following the removal of the former BHS Ltd offices and distribution centre with direct views available to the northern station entrance, taxi rank, and open green space to the north of the entrance. There are oblique views to the new high speed station spine building and views of the railway corridor, including tracks gantries and bridges. Therefore, the magnitude of change will be high.
- 12.6.57 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a major adverse significant effect in the winter of year 1 of operation.
- 12.6.58 In summer of year 1 of operation, effects will be unchanged due to the limited opportunities for new planting between the elements of the revised scheme and the viewpoint.
- 12.6.59 By year 15 and 60 of operation, the lack of mitigation planting between the receptor and the revised scheme means that the effects will be unchanged.
- 12.6.60 Effects at night will be non-significant and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Viewpoint 001.6.024: view east from 1 to 9 Melton Street

- 12.6.61 The demolition of Grant Thornton House and One Euston Square and the removal of the mature trees in Euston Square Gardens and along Melton Street will have opened up views over the potential development plots on the south western corner of the new high speed station. There will be open views towards the reinstated Euston Square Gardens. A new LU and station escape building will be present at the western end of Euston Square Gardens. Melton Street will be open to access for the bus station and will incorporate areas of high quality public realm where pedestrian usage is prioritised and links provided to connect with the wider network of streets and spaces. Overall, the magnitude of change will be high.
- 12.6.62 The high magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse significant effect in year 1.
- 12.6.63 In summer of year 1 of operation, effects will be unchanged as the new planting will be immature.
- 12.6.64 By year 15 and year 60 of operation, the proposed planting will be established but unlikely to recreate the stature of the existing trees due to the constraints of the

underground structures limiting potential root growth, therefore the significance of effects will be unchanged.

Viewpoint 002.3.001: view north from Friends House Gardens and offices in adjacent buildings

- 12.6.65 The reinstated Euston Square Gardens will be visible in the immediate foreground of the view. The lodges will be retained and together with the reinstated war memorial will be central to the view. The gardens will be redesigned to incorporate land occupied by the bus station access road which currently separates the east and west gardens. There will also be replacement tree planting in what will be a more unified area of gardens. The removal of Grant Thornton House, One Euston Square and mature trees in the western part of Euston Square Gardens in construction Stage A will have provided opportunities to view the new southern high speed station entrance on the far side of the reinstated gardens. The magnitude of change will be medium.
- 12.6.66 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.
- 12.6.67 In summer of the first year of operation, while the existing intervening vegetation will provide some additional screening, the magnitude of change will remain medium and the significance of effect will be unchanged.
- 12.6.68 Year 15 and 60 effects will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 002.6.002: view north-west from Euston Fire Station

- 12.6.69 The removal of the mature trees in Euston Square Gardens and along Eversholt Street will open up views across Euston Square Gardens towards the reconfigured bus station in the middle ground. The Podium and the southern LU entrance will also be visible. Replacement tree planting in the reinstated gardens will not be sufficiently mature in year 1 to replicate the stature of the existing trees. The magnitude of change will be medium.
- 12.6.70 The medium magnitude of change, assessed alongside the low sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.
- 12.6.71 In summer of the first year of operation, the overall effect will be unchanged on account of the immaturity of the vegetation.
- 12.6.72 Year 15 and year 60 effects will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 002.3.011: view north from Euston Square Gardens

- 12.6.73 There will be close and direct views across Euston Square Gardens towards the reconfigured bus station. The Podium and southern LU entrance will be visible in the foreground, the high speed station and modified conventional station in the middle and background of the view. To the west the Grade II* listed 1-9 Melton Street will be visible. The removal of Grant Thornton House and One Euston Square and the loss of

trees within the gardens will open up views towards the new high speed station. The southern approach to the station will be visible from Euston Square Gardens above the decks at the front of the new station. Built elements within the gardens will include the LU and station escape building, the reinstated war memorial and areas for cycle parking. The replacement tree and shrub planting within the gardens will be relatively immature in year 1. Therefore, the magnitude of change will be medium.

- 12.6.74 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.
- 12.6.75 In summer of year 1 of operation, effects will be unchanged due to the lack of maturity of the intervening planting.
- 12.6.76 Year 15 and 60 effects will be non-significant and are reported in SES2 and AP3 ES, Volume 5: Appendix LV-001-001, Part 4.

Viewpoint 004.2.004: view west from Dalehead, Gillfoot and Oxenholme

- 12.6.77 The reconstructed Hampstead Road Bridge and Granby Terrace Bridge will be conspicuous in the foreground of the view emphasised by the change in road levels. They will be seen in the context of the widened railway corridor with the decks over the new high speed railway between the two bridges in the middle ground of the view. The remaining residential blocks of the Regent's Park Estate and the new blocks to be developed by LBC on the Newlands plot and the former One Stop Shop site, the proposed open space north of Langdale and some of the properties at the southern end of Park Village East will be visible in the background on the far side of the railway corridor. The loss of trees adjacent to Hampstead Road Bridge in the communal gardens during construction and assumed replanting trees in year 1 (2033) will allow open views to the peripheral roads and beyond. Therefore, the magnitude of change will be medium.
- 12.6.78 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a moderate adverse significant effect in the winter of year 1 of operation.
- 12.6.79 The view of the replaced Hampstead Road Bridge from close to this location is illustrated on the photomontage shown in Figure LV-01-005 (Volume 2, CFA1 Map Book of the SES2 and AP3 ES). The photomontage has been prepared taking into account the raised elevation of the bridge and adjacent sections of Hampstead Road (which will place the representative viewpoint location partially underground). Therefore the photography for this photomontage has been taken at 1.95m high above the viewpoint location, using the verifiable photomontage methodology to reflect the change in levels resulting from the revised scheme.
- 12.6.80 In summer of year 1 of operation, effects will be unchanged because there is no mature intervening planting in the foreground of the views.
- 12.6.81 By year 15 and year 60 of operation, the replacement planting in the Amptill Estate is assumed to be mature and effects will be non-significant and are reported in Volume 5: SES2 and AP3 ES Appendix LV-001-001, Part 4.

Cumulative effects

- 12.6.82 There are no cumulative effects of the revised scheme in combination with any other committed development.

Other mitigation measures

- 12.6.83 The permanent effects of the revised scheme on landscape and visual receptors have been substantially reduced through incorporation of the measures described previously. Effects in year 1 of operation may be further reduced by establishing planting early in the construction programme, for example at the end of construction Stage A where possible, which will be considered during the detailed design stage. This will provide additional screening and greater integration of the revised scheme into the landscape. However, no other mitigation measures are considered practicable due to the high visibility of elements of the revised scheme and the sensitivity of the surrounding receptors.
- 12.6.84 High-quality architectural and landscape design will deliver many enhancements to the new high speed station frontages and entrances and associated soft landscaping including the restoration of Euston Square Gardens.

Summary of likely residual significant effects

- 12.6.85 As no other mitigation measures are practicable, the permanent residual significant effects during operation remain as described in section 12.6 above. Where new or replacement planting is proposed, significant effects will reduce over time as the proposed mitigation planting matures. However, the following significant residual effects will remain during operation after 2033:
- a moderate adverse significant effect on the Euston Road Commercial Area LCA in years 1, 15 and 60 of operation;
 - a moderate adverse significant effect on the Euston West Post-War Residential LCA in year 1 of operation;
 - a major adverse significant effect on residential views in years 1, 15 and 60 of operation at viewpoint 001.2.008: View north and east from Cobourg Street, viewpoint 001.2.016: View east from Hampstead Road, near The Tarns and Rydal Water residential blocks and viewpoint 001.2.022: View east from the front of Cartmel, Coniston and Newlands residential blocks;
 - a major adverse significant effect in years 1, 15 and 60 of operation on residents and pedestrians at viewpoint 001.3.021: View east from 106-108 Hampstead Road;
 - a moderate adverse significant effects on residential views in year 1 of operation at viewpoint 001.2.020: View north-east from Langdale and Augustus House and viewpoint 004.2.004: View west from Dalehead, Gillfoot and Oxenholme; on occupants of the commercial property at viewpoint 002.6.002: View north-west from Euston Fire Station; on pedestrians at viewpoint 002.3.001: View north from Friends House Gardens and offices in adjacent buildings and on pedestrians at viewpoint 002.3.011: View north from Euston Square Gardens;

- a moderate adverse significant effect in years 1, 15 and 60 of operation on transport users at viewpoint 001.4.002: View north from the corner of Euston Road and Gordon Street; on hotel occupants at viewpoint 001.5.011: View east from the Wesley Hotel and on occupants of commercial properties at viewpoint 001.6.024: View east from 1-9 Melton Street; and
- a moderate adverse significant effect on residential night-time views from viewpoint 001.2.008: View north and east from Cobourg Street and viewpoint 001.3.021: View east 106-108 Hampstead Road.

13 Socio-economics

13.1 Introduction

13.1.1 This section reports on the assessment methodology and scope, environmental baseline, and provides an assessment of the likely significant economic and employment effects during the construction and operation of the revised scheme.

13.1.2 The need for a socio-economic assessment results from the potential for the revised scheme to affect:

- existing businesses and community organisations and thus the amount of local employment;
- local economies, including employment; and
- planned growth and development.

13.1.3 The beneficial and adverse socio-economic effects of the revised scheme are reported at two different levels: route-wide and CFA. Effects on levels of employment are reported at a route-wide level in Volume 3 of the main ES. Localised effects on businesses and observations on potential local economic effects are reported within each CFA report.

Construction

13.1.4 The proposed construction works will have the following relevance in terms of socio-economics:

- premises demolished, with their occupants and employees needing to relocate to allow for construction of the revised scheme;
- effects on the amenity (e.g. air quality and construction dust, noise and vibration, construction traffic and visual impacts) and isolation of an area which could affect business operations. Any resulting effects on employment are reported at a route-wide level; and
- potential employment opportunities arising from construction in the local area (including in adjacent CFAs).

Operation

- 13.1.5 The proposed operation of the route will have relevance in terms of socio-economics, in relation to the potential employment opportunities created by new business opportunities.

13.2 Scope, assumptions and limitations

- 13.2.1 The assessment scope, key assumptions and limitations for the socio-economics assessment are set out in Volume 1, the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES. This report follows the standard assessment methodology.
- 13.2.2 Engagement with stakeholders and community organisations, including LBC, has been undertaken with regard to socio-economic resources that may be impacted by the revised scheme.

13.3 Environmental baseline

Existing baseline

Study area description

- 13.3.1 Section 5 of this report provides a general overview of the Euston area, which includes data of specific relevance to socio-economics, notably demographic and employment data. The following provides a brief overview in terms of employment, economic structure, labour market, and business premises availability within the area¹⁰⁶.
- 13.3.2 The Euston area is located within inner north London, entirely within the LBC. Euston is a dense, mixed employment and residential area. The area around Euston station is identified in the London Plan as an opportunity area¹⁰⁷ with significant capacity to accommodate new housing, commercial and other development linked to existing or potential improvements to public transport accessibility. The adopted EAP proposes a radical development and regeneration strategy for the Euston area, including extensive OSD above the station and approach, reflected in the ancillary works in the revised scheme. The plan sets out a vision for the area in 2031 which will see it "rejuvenated as both a local hub of activity and a gateway to London through new high-quality comprehensive and transformational development above and around a world class transport interchange", including via a strategy for the provision of employment space, sufficient to support between 7,700 and 14,100 jobs¹⁰⁸.
- 13.3.3 Where possible, baseline data has been gathered on DCAs¹⁰⁹ to provide a profile of local communities. Map SE-02-001 in the main ES (Volume 5, Socio-economics Map Book) shows the location of these DCAs. The area contains four DCAs: Regent's Park, Euston Square, Somers Town and Regent's Park Estate.

¹⁰⁶ Further information on the socio-economic baseline in the area including a business and labour market profile, is contained in Volume 5: Appendix SE-001-000 of the main ES.

¹⁰⁷ Greater London Authority, (2011), *The London Plan: Spatial Development Strategy for London*.

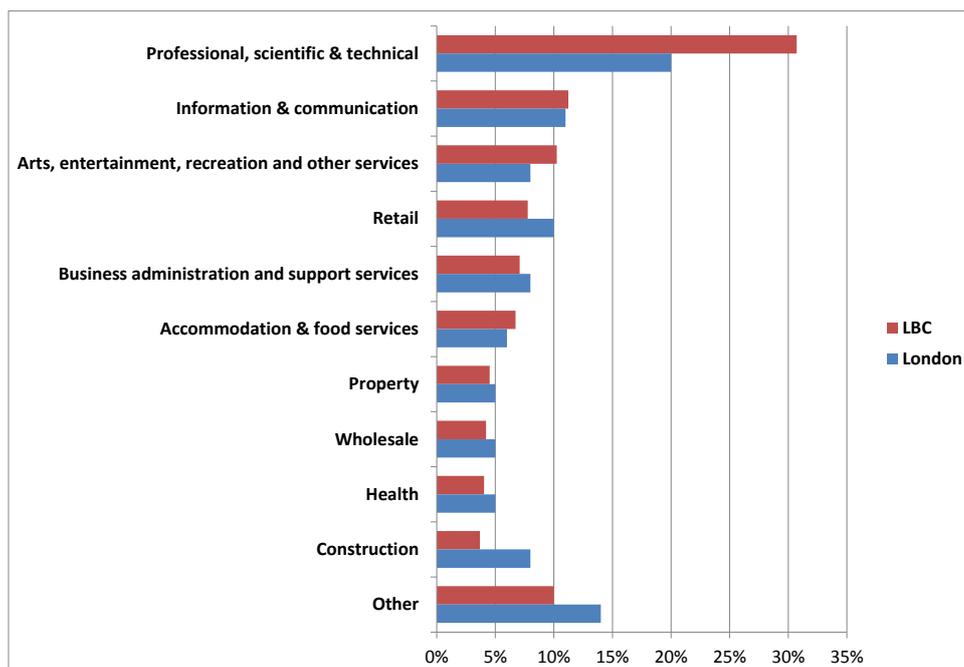
¹⁰⁸ Greater London Authority, Transport for London and Camden Council, (2015), *Euston Area Plan; A new plan for the Euston area*.

¹⁰⁹ DCA have been determined through an understanding of local context and aim to be aligned as closely as possible to groups of lower super output areas (LSOA).

Business and labour market

13.3.4 The professional, scientific and technical services sector accounts for the largest proportion of businesses (31%) in the LBC, with the information and communication (11%), arts, entertainment, recreation and other services (10%), and retail (8%) sectors also accounting for relatively large numbers of businesses within the borough. This is shown in Figure 10¹¹⁰. For comparison, within the London region, the professional, scientific and technical services sector accounts for the largest number of businesses (20%), with the information and communication (11%), and retail (10%) sectors also accounting for relatively large numbers of businesses within the region¹¹¹.

Figure 10: Business sector composition in the LBC and London^{111,112}



13.3.5

13.3.6 Approximately 291,000 people worked in the LBC, while 7,000 people worked within the Regent's Park DCA; 23,000 within Euston Square; 15,000 within Somers Town; and 9,000 within the Regent's Park Estate DCA¹¹³.

13.3.7 According to the Office for National Statistics (ONS) Business Register and Employment Survey 2011, the sector with the highest proportion of employment in the borough is professional, scientific and technical (22%), which accounts for a higher proportion of jobs than that recorded across London (13%) and England (8%). The business administration and support services sector is also important in the LBC accounting for 11% of employment compared to 10% recorded across London and 8% across England. The information and communication sector in the LBC accounts for 10% of employment, higher than that recorded for London (8%) and England (4%). This is shown in Figure 11.

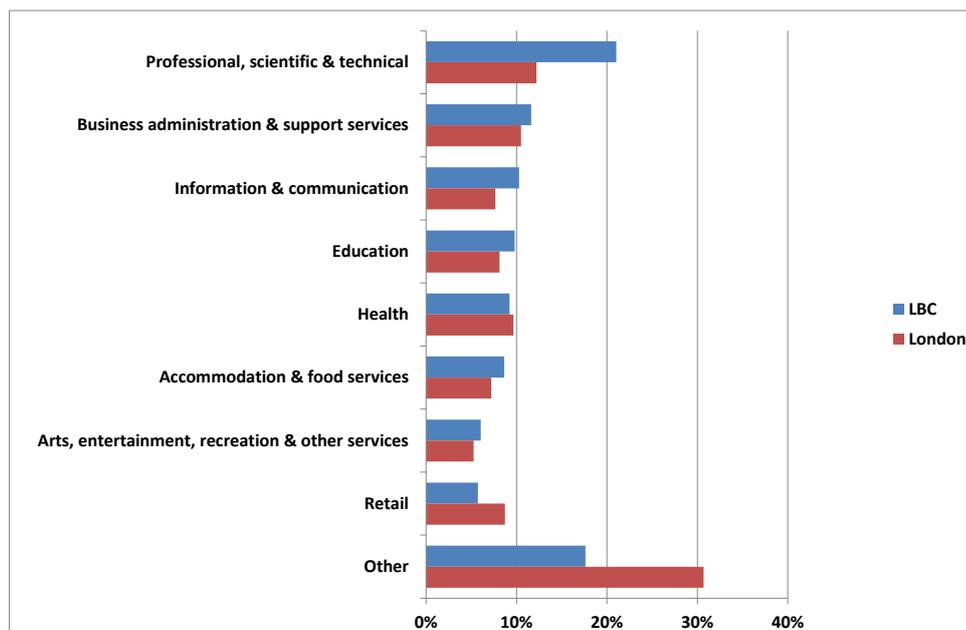
¹¹⁰ The figure presents the proportion of businesses within each business sector in the borough but not the proportion of employment by sector.

¹¹¹ Office for National Statistics, (2012), *UK Business: Activity, Size and Location 2011*, ONS, London. Please note 2011 data has been used to provide an appropriate comparison with 2011 Census data.

¹¹² 'Other' includes agriculture, forestry and fishing, production, motor trades, transport and storage (including postal), finance and insurance, public administration and defence; and education sectors.

¹¹³ ONS, (2012), *Business Register and Employment Survey 2011*, ONS, London.

Figure 11: Proportion of employment by industrial sector in the LBC and London^{113 114}



- 13.3.8 Key employment sectors for Regent's Park DCA are professional, scientific and technical (26%), information and communication (17%), finance and insurance (17%) and public administration and defence (11%). For Somers Town DCA, key sectors are professional, scientific and technical (14%), accommodation and food services (13%), transport and storage (including postal) (11%) and arts, entertainment, recreation and other services (11%). In Euston Square DCA, key sectors are professional, scientific and technical (21%), education (17%) and accommodation and food services (12%). For Regent's Park Estate DCA, key sectors are professional, scientific and technical (24%), transport and storage (including postal) (13%), information and communication (13%) and finance and insurance (13%).
- 13.3.9 According to the 2011 Census¹¹⁵, the employment rate¹¹⁶ for LBC residents in 2011 was 63% (109,000 people), which is broadly in line with that recorded for both London and England (both 65%). The employment rate in the Regent's Park DCA was 68%, 52% within Somers Town DCA, 38% within Euston Square DCA, and 47% within the Regent's Park Estate DCA.
- 13.3.10 The unemployment rate in the LBC in 2011 stood at 8%, slightly higher than the England average (7%). The unemployment rate in the Regent's Park DCA was 4%, 12% within Somers Town DCA, 14% within Euston Square DCA, and 13% within the Regent's Park Estate DCA¹¹⁷.
- 13.3.11 According to the 2011 Census, 51% of LBC residents aged 16 and over were qualified to National Vocational Qualification (NVQ) Level 4, compared to 38% in London and 27% in England, and 13% had no qualifications, which was lower than that recorded both for London (18%) and England (23%). In 2011, 55% of Regent's Park DCA

¹¹⁴ 'Other' includes agriculture, forestry and fishing, production, construction, motor trades, wholesale, transport and storage (including postal), financial and insurance, property and public administration and defence sectors.

¹¹⁵ ONS (2012), *Census 2011*, ONS, London.

¹¹⁶ The proportion of working age (16-74 years) of residents in employment. Employment comprises the proportion of the total resident population who are 'in employment' and includes full-time students who are employed.

¹¹⁷ Unemployment figures have been rounded to the nearest whole number. DCA unemployment rates are presented for each DCA in this chapter while in Section 2 they are shown in aggregate.

residents aged 16 and over were qualified to NVQ level 4, compared to 33% within Somers Town DCA, 39% within Euston Square DCA, and 27% within the Regent's Park Estate DCA. The proportion of residents with no qualifications was 11% in Regent's Park DCA, compared to 22% within Somers Town DCA, 6% within Euston Square DCA, and 20% within the Regent's Park Estate DCA.

- 13.3.12 The DCAs defined within the Euston area vary in terms of their character and socio-economic indicators. Somers Town DCA and Regent's Park Estate DCA are primarily residential areas, with commercial uses located on Chalton Street and Eversholt Street (Somers Town) and on and around Hampstead Road and Drummond Street (Regent's Park Estate). Each contain high proportions of social rented housing and have below average rates of employment and qualifications attainment compared to London and England. They also record higher unemployment levels and greater proportions of residents with no qualifications than regional and national averages. Euston Square DCA is more mixed in character containing commercial (Euston station and adjacent office and retail businesses), educational (UCL), health (UCLH) and residential uses (including student housing), though it has similarly below average rates of employment and qualifications attainment. Regent's Park DCA comprises mostly owner occupied/privately rented housing or parkland and has above average rates of employment and educational attainment and lower unemployment, outperforming the LBC as a whole.

Property

- 13.3.13 Data for quarter 3 of 2012 for the Euston area as defined and published by Colliers International indicates an office premises floorspace stock of 690,000m² with a vacancy rate of 5% (approximately 34,800m²)¹¹⁸. In the neighbouring 'City Midtown' area, the same source recorded vacancy rates of approximately 5%.
- 13.3.14 Average vacancy for office property in the LBC in July 2013 has been assessed as 9% based on marketed space against known stock¹¹⁹. Overall, this suggests moderate to good availability, although availability will vary by quality.
- 13.3.15 The LBC Business Premises Study (2011) indicates that local availability of such premises is constrained in the borough, with vacancies estimated at 2% (of a total stock of approximately 335,000m²)¹²⁰.
- 13.3.16 Average vacancy for industrial and warehousing property in the LBC in July 2013 has been assessed as 1% based on marketed space against known stock. Overall, this suggests very low availability of alternative accommodation.
- 13.3.17 January 2012 data from Colliers CRE¹²¹ identifies vacancy rates in retail space of around 3% in central London, which includes much of the Euston area.
- 13.3.18 Average vacancy for retail property in the LBC in July 2013 has been assessed as 2% based on marketed space against known stock. Overall, this suggests low availability of alternative accommodation.

¹¹⁸ Colliers International, (2012), *Central London Quarterly Offices: Quarter 3 2012*, Colliers International, London.

¹¹⁹ Vacant space is based on marketed space identified from Estates Gazette data (EGi); stock data is taken from information supplied by the Valuation Office (VOA).

¹²⁰ Roger Tym and Partners/London Borough Camden, (2011), *Camden Business Premises Study*, Roger Tym and Partners, London.

¹²¹ Colliers International, (2014), *Central London Retail Health Check- December 2014*, Colliers International, London.

Future baseline

Construction (2017)

- 13.3.19 SES2 and AP3 ES, Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2017. Implementation of all outstanding development consents and land allocations will result in approximately 300 additional jobs¹²² by 2017. The existing composition and numbers of employers, employees and economic sectors in the Euston area is likely to change over time in ways that cannot be accurately forecast.

Construction and operation (2026–2033)

- 13.3.20 SES2 and AP3 ES, Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2026. There are no committed developments in this area which are expected to accommodate significant additional employment between 2017 and 2026.

Operation (2033)

- 13.3.21 SES2 and AP3 ES, Volume 5, Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2033. There are no committed developments in this area which are expected to accommodate significant additional employment between 2026 and 2033.

13.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 13.4.1 In order to avoid or minimise the environmental impacts during construction, the revised scheme design includes provisions to:
- maintain access to business premises during the construction phase; and
 - maintain a pedestrian route between the existing conventional station and both Drummond Street and Euston Street, throughout the construction phase.
- 13.4.2 The draft CoCP includes a range of provisions that will help to mitigate the socio-economic effects associated with construction within the Euston area, including:
- consulting businesses located close to hoardings on the design, materials used and construction of the hoarding to reduce impacts on access to and visibility of their premises (draft CoCP, Section 5);
 - reducing nuisance through sensitive layout of construction sites (draft CoCP, Section 5);
 - applying BPM during construction works to minimise noise (including vibration) at sensitive receptors (including local businesses) (draft CoCP, Section 13);
 - requiring contractors to monitor and manage flood risk and other extreme

¹²² Potential employment has been estimated through employment floor space and the Homes and Communities Agency (HCA) (2010), *Employment Densities Guide 2nd edition*. The estimate is calculated using standard employment density ratios and estimates of floor areas.

weather events which may affect socio-economic resources during construction (draft CoCP, Sections 5 and 16); and

- site-specific traffic management measures including requirements relating to the movement of traffic from business and commercial operators of road vehicles, including goods vehicles (draft CoCP, Section 14).

Assessment of impacts and effects

Temporary effects

Change in business amenity value

- 13.4.3 Businesses within the Euston area may experience air quality, noise and vibration, visual or construction traffic impacts as a result of the construction of the revised scheme. Taken in combination, the residual effects from these other topic assessments may amount to a significant change in amenity, which leads to a possible loss of trade for the affected businesses.
- 13.4.4 The Exmouth Arms public house on Starcross Street may experience potentially significant noise and visual residual effects as a result of the proposed construction and demolition activities associated with the construction of the high speed station to the west of the existing conventional station. The sensitivity of this establishment is deemed to be high as users will be susceptible to changes in amenity and the construction works may discourage customers. These in-combination effects will occur over a period of approximately two years and six months and given the high levels of sensitivity, the revised scheme will have a significant amenity effect on this business.
- 13.4.5 The Wesley Hotel (previously the Methodist International Centre) on Euston Street may experience potentially significant noise and visual residual effects as a result of the proposed construction and demolition activities associated with the construction of the high speed station to the west of the existing conventional station. The sensitivity of this establishment is deemed to be high as users will be susceptible to changes in amenity and the construction works may discourage guests. These in-combination effects will occur over a period of approximately two years and six months and given the high level of sensitivity, the revised scheme will have a significant amenity effect on this business.
- 13.4.6 Drummond Street is located in close proximity to the existing conventional station and the revised scheme, running parallel with Euston Road. Drummond Street is well known for its South Asian restaurants and supply shops and is frequented in particular by local residents and station users. Although it is acknowledged that there may be some disruption to business activities on Drummond Street due to the construction of the high speed station to the west of the existing conventional station, the revised scheme will not have a significant amenity effect on these businesses.
- 13.4.7 The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3 of the main ES).

Isolation

- 13.4.8 Businesses within the Euston area may experience significant isolation effects as a result of the construction of the revised scheme. As a consequence, this could lead to a loss of trade for the affected businesses.
- 13.4.9 Works associated with the construction of the high speed station will require a number of road closures. Some buildings along Cardington Street and Melton Street and buildings between Cardington Street and the east side of Cobourg Street will be demolished.
- 13.4.10 As a consequence of these construction works the following roads will be permanently closed: Melton Street (south of Cardington Street); and Cardington Street. The following roads will be closed for a 10 year period; a section of Stephenson Way from its junction with Euston Street to a point past Wolfson House; and for Euston Street, Drummond Street and Starcross Street, the section of each road between Cardington Street and Cobourg Street. During the construction works the following roads will become cul-de-sacs: Euston Street, Drummond Street, Starcross Street and Stephenson Way. Vehicular access to these roads during the 10 year period of closure will be via North Gower Street.
- 13.4.11 A pedestrian access route from Euston station through to both Drummond Street and Euston Street will also be maintained throughout the construction period. Given both pedestrian and vehicular access is maintained throughout the construction period to these roads, there will be no significant isolation effect.

Construction employment

- 13.4.12 There will be a number of construction compounds for the revised scheme within the CFA, including the National Temperance Hospital and the Podium main compounds. These locations are set out in Section 5.3 of this report.
- 13.4.13 The peak number of construction personnel at all construction sites at Euston is estimated to be approximately 1,960 between mid-2022 to the end of 2026 in construction Stage A. In addition, a further 400 HS2 Ltd project staff will be present at Euston for the duration of the construction phase. Depending on skill levels required and the skills of local people, many of these job opportunities are potentially accessible to residents in the locality and to others living further afield, particularly given the location of the works at/close to an inner London transport hub.
- 13.4.14 The impact of the direct construction employment creation has been assessed as part of the route-wide assessment (see Volume 3 of the main ES).
- 13.4.15 Direct construction employment created by the revised scheme could also lead to opportunities for local businesses to supply the project or to benefit from expenditure by construction workers. The impact of the indirect construction employment creation has been assessed as part of the route-wide assessment (see Volume 3 of the main ES).

Cumulative effects

- 13.4.16 No committed developments have been identified that will interact with the revised scheme.

- 13.4.17 Cumulative effects arise in relation to the accumulation of individual resource based job displacement/losses on a local labour market. These effects are assessed and reported as part of the route-wide assessment (see Volume 3 of the main ES).

Permanent effects

Businesses

- 13.4.18 Businesses directly affected, i.e. those that lie within land which will be acquired for the construction of the revised scheme, are reported in groups where possible to form defined resources, based on their location and operational characteristics. A group could contain either one or a number of businesses, reflecting the fact that a building may have more than one occupier or that similar businesses/resources are clustered together.
- 13.4.19 In construction Stage A, 55 businesses within the Euston area will be directly impacted by the revised scheme. These together form 17 defined resources. Eight of the resources which experience direct impacts are subject to potentially significant effects on business activities and employment. These resources are listed in Table 17.

Table 17: Resources with potentially significant direct effects in construction Stage A

Resource	Description of business activity
Retail premises within Euston station	Retail premises within Euston station and the forecourt
Royal Mail delivery office, 1 Barnby Street	Combined office and storage building
Offices, 132-140 Hampstead Road	Combined office and storage building in educational use by UCL
Ibis Hotel Euston, 3 Cardington Street	Hotel at Cardington Street/Drummond Street junction
Thistle Euston Hotel, Cardington Street	Hotel north of St. James's Gardens on Cardington Street
The Cottage Hotel, 67-75 Euston Street	Hotel on Euston Street
Wolfson House, 4 Stephenson Way	Accommodates a laboratory used by UCL and technical support services for the UCL campus and other businesses
93-103 Drummond Street	Retail business with ancillary storage and office space

Impact magnitude

- 13.4.20 The magnitude of impact focuses on the number of jobs which are affected (either through displacement or possible loss) by the revised scheme. It also considers the implications of this impact in relation to the scale of economic activity and opportunities in the area.

Sensitivity

- 13.4.21 The following was taken into account when considering the sensitivity of resources:
- availability of alternative, suitable premises;
 - size of the local labour market;

- skill levels and qualifications of local people; and
- levels of unemployment.

Significance of effect

13.4.22 Taking account of the sensitivity of the resource and the magnitude of impact, the significance of the resultant effects is set out in Table 18.

Table 18: Significance of effect on resources in construction Stage A

Resource	Impact magnitude	Sensitivity	Significance of effect
Retail premises within Euston station	High	Medium	Major adverse
Royal Mail delivery office, 1 Barnby Street	Medium	Medium	Moderate adverse
Offices, 132-140 Hampstead Road	High	Low	Moderate adverse
Ibis Hotel Euston, 3 Cardington Street	High	Medium	Major adverse
Thistle Euston Hotel, Cardington Street	High	Medium	Major adverse
The Cottage Hotel, 67-75 Euston Street	Medium	Medium	Moderate adverse
Wolfson House, 4 Stephenson Way	High	Medium	Major adverse
93-103 Drummond Street	Medium	Medium	Moderate adverse

13.4.23 Construction at Euston station will require the demolition of retail premises within the existing conventional station forecourt as part of a phased demolition process. It is considered likely that most of these businesses affected are dependent upon their location in/next to the station. Consequently, there is likely to be some loss of retail activity and employment, although this can be kept to a minimum through appropriately timed phasing. Overall, the effect on this resource and its employees is assessed to be major adverse and will therefore be significant.

13.4.24 The combined office and storage building at the Royal Mail delivery office on Barnby Street is proposed to be demolished. With moderate to good availability of alternative premises, it is reasonably likely that the office component of the premises will be able to find and move to alternative local premises. Availability of alternative warehousing/storage premises in LBC is constrained and such business activity may therefore find it more difficult to find alternative local premises. The effect on this resource and its employees will be moderate adverse and will therefore be significant.

13.4.25 The revised scheme will require the demolition of 132-140 Hampstead Road previously used as a combined office and storage building. UCL has a five year lease on the building, ending in 2018, and will use it to rehouse the Bartlett School of Architecture while the school's current premises are refurbished. The effect on this resource and its employees will be moderate adverse and will therefore be significant.

- 13.4.26 The Ibis Hotel Euston, the Thistle Euston Hotel and Cottage Hotel will be demolished. Hotels can be bespoke buildings and there is a more limited supply than, for example, office space. These operators may have difficulty in finding suitable alternative premises. The effect on the Ibis Hotel Euston and the Thistle Euston Hotel and their employees will be major adverse, in each case, and will therefore be significant. The effect on the Cottage Hotel and its employees will be moderate adverse and will therefore also be significant.
- 13.4.27 The revised scheme will require the demolition of Wolfson House, which includes a laboratory, offices and technical support services belonging to UCL. The occupier will find it difficult to find suitable alternative accommodation given the specific locational and design requirements associated with the facility. The effect on this resource and its employees will be major adverse and will therefore be significant.
- 13.4.28 The revised scheme will require the demolition of 93-103 Drummond Street, a photographic equipment and supplies retailer. The occupier will find it difficult to find suitable alternative accommodation given the limited supply of available floorspace within LBC. The effect on this resource and its employees will be moderate adverse and will therefore be significant.
- 13.4.29 There are also locations where the construction footprint requires the demolition of properties or renders current business activities inoperable, but where the associated employment losses do not present particular relocation problems given the office-type premises that these occupiers will require and the availability of alternative premises. These properties include:
- One Euston Square (also known as 40 Melton Street and formerly known as Railtrack House);
 - the Podium (not demolished but to be used as construction offices);
 - Grant Thornton House, 22 Melton Street; and
 - Walkden House, 10 Melton Street.
- 13.4.30 It is estimated that the revised scheme will result in the displacement or possible loss of a total of 2,865 jobs¹²³ within the Euston area during construction Stage A. The impact on the local economy from the loss/relocation of jobs will be relatively moderate in the context of the total number of people employed in the LBC (approximately 291,000) and the scale of economic activity and opportunity in the area.

Cumulative effects

- 13.4.31 No committed developments have been identified that will interact with the revised scheme.

¹²³ Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floor space and the Homes and Communities Agency (HCA) *Employment Densities Guide 2nd Edition* (2010). The estimate is calculated using standard employment density ratios and estimates of floor areas and may vary significantly from actual employment at the sites.

- 13.4.32 Cumulative effects arise in relation to the accumulation of individual resource based job displacement/losses on a local labour market. These effects are assessed and reported as part of the route-wide assessment (see Volume 3 of the main ES).

Other mitigation measures

- 13.4.33 The assessment has concluded that there are significant adverse effects arising during construction in relation to businesses directly affected by the revised scheme.
- 13.4.34 Businesses displaced by the revised scheme will be fully compensated within the provisions of the National Compensation Code. HS2 Ltd recognises the importance of displaced businesses being able to relocate to new premises and will therefore provide additional support over and above statutory requirements to facilitate this process. HS2 Ltd is also working with the LBC Business Mitigation and Opportunities Group to identify measures to offset the impact of the revised scheme on local businesses.
- 13.4.35 HS2 Ltd has undertaken engagement with businesses at Drummond Street so that any impacts on their business activities arising from the construction at Euston are reduced or eliminated.
- 13.4.36 The revised scheme offers considerable opportunities to businesses and residents along the line of route in terms of supplying goods and services and obtaining employment. HS2 Ltd is committed to providing support to businesses and local residents to facilitate access to procurement and employment opportunities arising from the construction of the revised scheme.

Summary of likely residual significant effects (2017–2026)

- 13.4.37 Likely significant residual effects are shown on maps SE-01-001 to SE-01-002 (see SES2 and AP3 Volume 5: Socio-economics Map Book). The revised scheme will require the demolition of eight significantly affected socio-economic resources. During construction customers will be discouraged from using the Exmouth Arms on Starcross Street and the Wesley Hotel on Euston Street as they are likely to be affected by construction works associated with the high speed station.

13.5 Effects arising during Stage B1 construction and operation (2026–2033)

- 13.5.1 The assessment of impacts and effects for the Stage B1 construction and operation period is based on the completion of the first six high speed platforms, concourses and western high speed station buildings to open as HS2 Phase One in 2026 and the ongoing construction associated with the remaining five high speed platforms and eastern side of the high speed station to be completed by the opening of HS2 Phase Two in 2033.

Avoidance and mitigation measures

- 13.5.2 Effects arising from the land required for construction compounds reported in construction Stage A continue during construction Stage B1, where these remain in use, with the addition of two new compounds. The effects on business amenity reported in construction Stage A do not continue in construction Stage B1.

Assessment of impacts and effects

Temporary and permanent effects

Change in business amenity value

- 13.5.3 No businesses have been identified within the area that will experience significant amenity effects as a result of the construction of the revised scheme in Stage B1.

Construction employment

- 13.5.4 There will be a number of construction compounds for the revised scheme within the CFA, including the National Temperance Hospital and the Podium main compounds. These locations are set out in Section 5 of this report.
- 13.5.5 The peak number of construction personnel at all construction sites at Euston is estimated to be approximately 2,050 in construction stage B1 between mid-2030 to the end of 2033. HS2 Ltd project staff will continue to be present at Euston during Stage B1 construction.
- 13.5.6 The impact of the direct construction employment creation has been assessed as part of the route-wide assessment (see Volume 3 of the main ES).
- 13.5.7 Direct construction employment created by the revised scheme could also lead to opportunities for local businesses to supply the project or to benefit from expenditure by construction workers. The impact of the indirect construction employment creation has been assessed as part of the route-wide assessment (see Volume 3 of the main ES).
- 13.5.8 Retail floorspace will also be built at the high speed station as part of the revised scheme during construction Stage B1. This will result in provision of approximately 7,000m² of retail floorspace with an overall net gain of approximately 4,800m² of retail floorspace, (equivalent to approximately 253 additional jobs), after taking account of the displaced retail floorspace.

Businesses

- 13.5.9 14 businesses within the Euston area would be directly impacted by the revised scheme during construction Stage B1. These together form one defined resource (retail premises within Euston station), which would be subject to potentially significant effects on business activities and employment.
- 13.5.10 Construction of the high speed station during Stage B1 will require the demolition of retail premises within the existing conventional Euston station and the station forecourt as part of a phased demolition process and to facilitate the relocation of passenger facilities that are affected by those works. It is likely that most of these businesses affected are dependent upon their location in/next to the station. Consequently, there is likely to be some loss of retail activity and employment, although this could be kept to a minimum through appropriately timed phasing. Overall, the effect on this resource and its employees will be major adverse and will be significant.

Operational employment

- 13.5.11 Operational employment will be created at locations along the route including stations, train crew facilities and infrastructure/maintenance depots. Initial estimates suggest that gross direct employment for the high speed station and train operations is likely to rise to approximately 500 jobs by 2033.
- 13.5.12 The revised scheme will also contribute significantly to the creation of wider development opportunities (including OSD) in the Euston area. It is reasonable to anticipate that in this way, the project will help to generate significant employment opportunities as part of the realisation of the adopted EAP. To give an indication of the full scale development potential, the adopted EAP proposes 280,000m² of employment floorspace, which could accommodate 14,100 jobs, and new retail, leisure and social infrastructure, to serve the station and support local communities.
- 13.5.13 Direct operational employment created by the revised scheme could also lead to indirect employment opportunities for local businesses supplying the project and businesses associated with the retail floorspace or OSD, or benefiting from expenditure of directly employed workers on goods and services.
- 13.5.14 Some of these employment opportunities will be accessible to residents in the locality and, given the transport accessibility of the area within the London travel to work area (TTWA), also to residents living further afield.
- 13.5.15 The impact of operational employment creation has been assessed in aggregate as part of the route-wide assessment (Volume 3 of the main ES).

Cumulative effects

- 13.5.16 No committed developments have been identified that will interact with the revised scheme.

Other mitigation measures

- 13.5.17 The assessment has concluded that there are significant adverse effects arising during construction Stage B1 in relation to businesses directly affected by the revised scheme, although there will, in due course, be a net gain in retail business floorspace and employment at the station.
- 13.5.18 Businesses displaced by the construction will be compensated within the provisions of the National Compensation Code. HS2 Ltd recognises the importance of displaced businesses being able to relocate to new premises and will therefore provide additional support over and above statutory requirements to facilitate this process. HS2 Ltd is also working with the LBC Business Mitigation and Opportunities Group to identify measures to offset the impact of the revised scheme on local businesses.
- 13.5.19 The revised scheme offers considerable opportunities to businesses and residents along the line of route in terms of supplying goods and services and obtaining employment. HS2 Ltd is committed to providing support to businesses and local residents to facilitate access to procurement and employment opportunities arising from the construction of the revised scheme.
- 13.5.20 The assessment has concluded that operational effects during Stage B1 will be either negligible or beneficial and therefore mitigation is not needed.

Summary of likely residual significant effects (2026–2033)

- 13.5.21 Likely significant residual effects are shown on Maps SE-01-001 to SE-01-002 (SES2 and AP3 ES, Volume 5: Socio-economics Map Book). The revised scheme will require the demolition of one significantly affected socio-economic resource – Retail premises within Euston station.

13.6 Effects arising during operation (2033 onwards)

- 13.6.1 The assessment of impacts and effects for the operation period is based on the operation of all HS2 platforms and the conventional station from 2033 onwards.
- 13.6.2 Assessment of impacts and effects
- 13.6.3 The operational and business employment effects described for 2026-2033 will continue after 2033.
- 13.6.4 Summary of likely residual significant effects (2033 onwards)
- 13.6.5 The operational and business employment effects described for 2026-2033 will continue after 2033, and are considered to be permanent.

14 Sound, noise and vibration

14.1 Introduction

- 14.1.1 This section reports the assessment of the likely significant noise and vibration effects arising from the construction and operation of the revised scheme for the Euston area on:
- people, primarily where they live ('residential receptors') in terms of a) individual dwellings and b) on a wider community basis, including any shared community open areas¹²⁴; and
 - community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'¹²⁵.
- 14.1.2 The assessment of likely significant effects from noise and vibration on community, cultural heritage and ecological receptors are presented in Sections 8, 9 and 10 of this report, respectively.
- 14.1.3 In this assessment 'sound' is used to describe the acoustic conditions which people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of community areas is likely to be modified through the introduction of the revised

¹²⁴ 'shared community open areas' are those that the emerging National Planning Practice Guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (e.g. park to local green space) that is nearby.

¹²⁵ Quiet areas are defined in the SMR as Quiet Areas as identified under the Environmental Noise Regulations or are resources which are prized for providing tranquillity.

scheme. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

14.1.4 Effects can either be temporary from construction, or permanent from the operation of the revised scheme. These effects may be direct, resulting from the construction or operation of the revised scheme, or indirect e.g. resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the revised scheme. Direct and indirect effects are reported separately below. Temporary construction effects predicted during the Stage A and Stage B1 construction phases are reported in Section 14.3 and permanent effects arising from 2026 onwards are reported in Section 14.4. These sections also set out the means to avoid or reduce the adverse effects that may occur. Cases where noise or vibration from temporary construction and permanent operation are likely to coincide are discussed in Section 14.3.

14.1.5 The approaches to assessing sound, noise and vibration and appropriate mitigation are outlined in Volume 1 of the main ES and scope and methodology are defined in the following documents:

- SMR (main ES Appendix CT-001-000/1); and
- SMR addendum (main ES Appendix CT-001-000/2).

14.1.6 More detailed information and mapping regarding the sound, noise and vibration assessment for Euston is available in the relevant appendices in Volume 5:

- sound, noise and vibration: route-wide assumptions and methodology (main ES: Volume 5, Appendix SV-001-000);
- sound, noise and vibration: baseline (SES2 and AP3 ES: Volume 5, Appendix SV-002-001);
- sound, noise and vibration: construction assessment (and SES2 and AP3 ES: Volume 5, Appendix SV-003-001);
- sound, noise and vibration: operation assessment (and SES2 and AP3 ES: Volume 5, Appendix SV-004-001); and
- map Series SV-01, SV-02, SV-03 and SV-04 (and SES2 and AP3 ES: Volume 5, Sound, Noise and Vibration Map Book).

14.2 Environmental baseline

Existing baseline

14.2.1 The existing baseline sound environment for this area was measured by a series of surveys in 2012 and 2013 with some supplementary surveys in 2015 (see SES2 and AP3 ES Appendix SV-002-001). The existing baseline sound environment was found to be typical of urban central London.

- 14.2.2 Sound levels are high in close proximity to busy multi-lane roads, such as A501 Euston Road, where daytime sound levels are typically around 75dB¹²⁶. However, due to the screening provided by buildings and other structures, sound levels can be much lower (typically 55 to 60dB) on side roads away from the major thoroughfares.
- 14.2.3 To the north of A501 Euston Road, sounds from existing trains (including 'wheel squeal'), traffic on A400 Hampstead Road and other local roads contribute to the prevailing sound environment. Here, daytime sound levels are typically 65 to 70dB.
- 14.2.4 To the east of the station, sound from traffic on the A4200 Eversholt Street, a relatively busy road, dominates the sound environment and daytime sound levels are typically around 70dB. Side roads away from the station have lower sound levels, due to the screening effect of buildings and other obstacles between these locations and the main road traffic sound sources, resulting in daytime sound levels of typically 55 to 60dB.
- 14.2.5 Located to the south of the station is the A501 Euston Road, which is a very busy cross London route. Local to this road, traffic movements, including many buses and HGV, generate sound levels during the day of around 75dB. Further to the south, smaller side roads can be screened from the busy main roads - typically experiencing sound levels around 65dB. Local traffic still dominates the sound environment.
- 14.2.6 To the west of the station, in St James's Gardens and adjacent areas, sound levels are relatively low for an urban environment. Daytime levels are typically around 55dB, due to the screening of the main road traffic sound by buildings and other obstacles. The playground of Maria Fidelis Convent (Lower) School borders St James's Gardens and also experiences sound levels which are relatively low for such an urban location.
- 14.2.7 Night-time sound levels¹²⁷ across the study area are lower than daytime levels, generally being approximately 2 to 4dB lower than the daytime level where it is dominated by road traffic on busy main roads and 5 to 8dB lower in locations further away from these roads.
- 14.2.8 Additional baseline sound measurements have been completed during 2015 in CFA1 to inform the assessment. These included measurements on Park Village East where the sound environment primarily consists of sounds from road traffic on local roads and busier but more distant roads. Measurements were also carried out around Euston Street and at Regnart Buildings where the sound environment was in places dominated by mechanical plant, such as cooling fans, on nearby buildings.
- 14.2.9 Further information on the existing baseline, including the baseline sound levels used in the assessment and baseline monitoring results, is provided for this area in SES2 and AP3 ES Volume 5 Appendix SV002-001.
- 14.2.10 It is likely that the majority of receptors adjacent to the revised scheme are not currently subject to appreciable vibration, save for those receptors closest to the existing railway. No vibration baseline measurements have therefore been undertaken. On a reasonable worst-case basis, vibration from the revised scheme has therefore been assessed at all receptors using specific thresholds, as defined in British

¹²⁶ Quoted dB values at residential areas refer to the free-field 16 hour daytime (07:00 to 23:00) equivalent continuous sound pressure level, $L_{pAeq,16hr}$.

¹²⁷ Night-time sound levels refer to the free-field 8 hour night-time (23:00 to 07:00) equivalent continuous sound pressure level, $L_{pAeq,8hr}$.

Standards, below which receptors will not be affected by vibration, as described in the main ES Volume 1, Section 8.

Future baseline

- 14.2.11 Without the revised scheme, existing sound levels in this area are likely to increase slowly over time. This is primarily due to road traffic growth. Changes in car technology may offset some of the expected sound level increases due to traffic growth on low speed roads. On higher-speed roads¹²⁸, tyre sound dominates and hence the expected growth in traffic is likely to continue to increase ambient sound levels.

Construction (2017)

- 14.2.12 The assessment of noise from construction activities assumes a baseline year of 2017 which represents the period at the start of construction. As a reasonable worst case, it has been assumed that no change in baseline sound levels will occur between the existing baseline (2012/13 and 2015) and the future baseline year of 2017.
- 14.2.13 Traffic flows for 2021 were used as the baseline to assess construction traffic noise in 2023 which is the period in which construction traffic is generally expected to be at its highest. Further information can be found in Section 15, Traffic and transport.

Operation (2026)

- 14.2.14 The assessment is based upon the predicted change in sound levels that result from the revised scheme and assumes a baseline year of 2026 to coincide with the proposed start of high speed passenger services. As a reasonable worst case, it has been assumed that no change in baseline sound levels around Euston will occur between the existing baseline and the future baseline year of 2026.

14.3 Construction effects arising during Stage A construction and Stage B1 construction and operation (2017–2033)

Local assumptions and limitations

Local assumptions

- 14.3.1 The construction arrangements that form the basis of the assessment are presented in Sections 5.2 to 5.4 of this report.
- 14.3.2 At Euston, the following illustrate the noise-generating activities that may need to be undertaken during the evening or night-time:
- evening work to construct retaining walls and abutment works in the station approach;
 - night work to demolish the carriage shed and buildings close to the railway;
 - night work to demolish parts of Granby Terrace Bridge, Hampstead Road Bridge and Mornington Street Bridge, including installation of bridge demolition decks;

¹²⁸ Tyre noise typically becomes the dominant sound source for steady road traffic at speeds above approximately 30mph.

- night work to construct parts of Granby Terrace Bridge, Hampstead Road Bridge and Mornington Street Bridge including construction of new bridge piers, installation of temporary supports, trusses and precast decks; and
- evening and night work near the tunnel portal to demolish railway structures, to rebuild the railway tunnel, and construct the retaining wall structures within the approaches adjacent to the live railway.

14.3.3 The assessment takes account of people’s perception of noise throughout the day and more stringent criteria are applied in this assessment during evening and night-time periods when people are more sensitive to noise compared to the busier and more active daytime period. Details of these criteria are set out in the main ES Volume 5 Appendix SV-001-000.

Local limitations

14.3.4 In this area, there are a number of locations where the land or property owners did not permit baseline sound level monitoring to be undertaken at their premises. However, sufficient information has been obtained to undertake the assessment. Further information is provided in SES2 and AP3 ES Volume 5: Appendix SV-002-001.

14.3.5 The construction works in Euston are complex and spatially constrained. At this stage of the design, the contractors who will do the construction work have not been appointed. The level of detail on likely construction methods available at this time is adequate to predict likely noise levels, and as subsequently discussed, a standard extent of mitigation known to be deliverable throughout the works has been included. It is, however, likely that under the requirements of the draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000) the contractors will, by applying the BPM specific to each site, find additional ways to reduce noise levels so that the extent of noise insulation and residual impacts will be less and of shorter duration than those reported at this stage.

Avoidance and mitigation measures

14.3.6 The potential for substantial impacts from construction noise over extended periods of time in the Euston area was identified early in the development of the scheme design and, from autumn 2012 onwards, noise assessments were used to inform the choice of construction methods. Early studies focused on reducing the potential for disturbance at night. Alternative working methods for some night-time activities such as bridge demolitions have been adopted, significantly reducing the effects on local communities.

14.3.7 Input from Park Village East residents resulted in a change in the way the southern part of the barrette walls will be built, moving as many as possible of the noisier works to track level in the railway cutting, thus reducing noise sources at street level.

14.3.8 Construction traffic using local roads in the Regent’s Park Estate was identified as a source of noise impact early in the transport studies. The proposal to reopen Granby Terrace Bridge in 2020 to take construction traffic from the western bulk excavation area straight to Hampstead Road via Granby Terrace Bridge, rather than through the Regent’s Park Estate, has been adopted as an effective noise mitigation measure, since fewer receptors will be affected.

- 14.3.9 The assessment assumes the implementation of the principles and management processes set out in the draft CoCP (Section 13) which are:
- BPM as defined by the Control of Pollution Act 1974 and Environmental Protection Act 1990 will be applied during construction activities to minimise noise (including vibration) at neighbouring residential properties;
 - as part of BPM, mitigation measures are applied in the following order:
noise and vibration control at source: for example the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings; and then screening: for example local screening of equipment or perimeter hoarding;
 - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary re-housing will be offered in accordance with the draft CoCP Section 13.2, which sets out the noise insulation and temporary re-housing policy;
 - lead contractors will seek to obtain prior consent from the relevant local authority under Section 61 of CoPA for the proposed construction works. The consent application will set out BPM measures to minimise construction noise, including control of working hours, and provide a further assessment of construction noise and vibration including confirmation of noise insulation/temporary re-housing provision;
 - contractors will undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data will be provided regularly to and be reviewed by the Nominated Undertaker and will be made available to the local authorities; and
 - contractors will be required to comply with the terms of the draft CoCP and appropriate action will be taken by the nominated undertaker as required to ensure compliance.
- 14.3.10 In addition to this mitigation, taller (3.6m) screening as described in the draft CoCP¹²⁹ has been assumed, wherever practicable, along the edge of the majority of the construction site boundaries, where significant noise effects would be likely to arise.
- 14.3.11 Noise insulation will be offered for qualifying buildings as defined in the draft CoCP noise insulation and temporary rehousing policy. Noise insulation or ultimately temporary rehousing will avoid residents being significantly affected¹³⁰ by levels of construction noise inside their dwellings.
- 14.3.12 Qualification for noise insulation and temporary re-housing will be identified as part of seeking prior consent from the local authorities under Section 61 of the CoPA. Qualifying buildings will be identified early enough so that noise insulation can be

¹²⁹ As described in the draft CoCP, provided as necessary by solid temporary hoarding, temporary earth stockpiles, screening close to the activities or other means to provide equivalent noise reduction.

¹³⁰ Information is provided in National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk>,

installed, or temporary rehousing provided, before the start of the works predicted to exceed noise insulation or temporary rehousing criteria. Noise insulation, where required, will be installed as early as possible to reduce internal sound levels from construction activities, will also be effective when the revised scheme comes into operation.

Assessment of impacts and effects

Residential receptors: direct effects – individual dwellings

14.3.13 Taking account of the avoidance and mitigation measures set out in the previous paragraphs, the following residential buildings are forecast to experience noise levels higher than the noise insulation trigger levels as defined in the draft CoCP:

- in the Park Village East area (approximately 165 dwellings):
 - Park Village East, Cubitt Court (approximately 30 dwellings);
 - Parkway (approximately 10 dwellings);
 - Park Village East, Silsoe House, (approximately 35 dwellings);
 - Park Village East, Richmond House (approximately 45 dwellings);
 - Park Village East, Goldsmiths House (approximately 20 dwellings); and
 - Park Village East, individual houses (approximately 25 dwellings); and
- in the Mornington Terrace area (approximately 130 dwellings):
 - Delancey Street (approximately 25 dwellings);
 - Mornington Terrace, North (approximately 60 dwellings);
 - Mornington Place (approximately 20 dwellings); and
 - Mornington Crescent, (approximately 25 dwellings); and
- in the Ampthill Estate (approximately 320 dwellings):
 - Ampthill Estate, Barnby St (approximately 25 dwellings);
 - Ampthill Estate, Mickledore (approximately 10 dwellings);
 - Ampthill Estate, Brathay (approximately 10 dwellings);
 - Ampthill Estate, Calgarth/ Glenridding (approximately 35 dwellings);
 - Ampthill Estate, Oxenholme (approximately 80 dwellings);
 - Ampthill Estate, Dalehead (approximately 80 dwellings); and
 - Ampthill Estate, Gillfoot (approximately 80 dwellings); and
- in the Cobourg Street area (approximately 100 dwellings):
 - Cobourg Street (approximately 30 dwellings);
 - Starcross Street (approximately 20 dwellings);

- Drummond Street (approximately 35 dwellings); and
- Euston Street (approximately 15 dwellings); and
- in the Regents Park Estate area (approximately 310 dwellings):
 - Hampstead Road, The Tarns (approximately 30 dwellings);
 - Hampstead Road, Cartmel, (approximately 70 dwellings);
 - Harrington Street, Coniston (approximately 40 dwellings);
 - Harrington Street, Langdale (approximately 40 dwellings);
 - Augustus St, Augustus House (approximately 60 dwellings);
 - Augustus St, Tintern House (approximately 15 dwellings);
 - Hampstead Road, proposed replacement housing in front of Newlands (approximately 30 dwellings); and
 - Hampstead Road, proposed replacement housing in front of Rydal Water (approximately 25 dwellings).

14.3.14 The mitigation measures, including noise insulation where necessary in the affected parts of these buildings, will reduce noise inside all dwellings to a level where it should not significantly affect residents.

14.3.15 Construction works close to the following residential buildings are forecast to result in ground-borne noise or vibration greater than the level at which it is likely to significantly affect the occupants for durations of up to three months:

- Mornington Terrace;
- Ampthill Estate, Gillfoot ;
- Cobourg Street and Euston Street; and
- Hampstead Road, Cartmel.

14.3.16 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant ground-borne noise and vibration effects, for example through the use of alternative construction methods.

Residential receptors: direct effects – communities

14.3.17 With regard to noise outside dwellings, the assessment of temporary effects takes account of construction noise relative to existing sound levels. In locations with lower existing sound levels¹³¹, construction noise effects¹³⁰ are likely to be caused by changes to noise levels outside dwellings. These may be considered by the local community as an effect on the acoustic character of the area and hence be perceived as a change in the quality of life. These effects are considered to be significant when assessed on a community basis taking account of the local context¹³².

¹³¹ Further information is provided in main ES Volume 5: Appendix SV-001-000.

¹³² Further information is provided in main ES Volume 5: Appendix SV-001-000 and SES2 and AP3 Volume 5: Appendix SV-003-001.

- 14.3.18 Vibratory piling of bridge piers and vibro-compaction is likely to result in appreciable ground-borne vibration at a small number of dwellings closest to these activities, as listed in Table 19. These receptors will also be exposed to appreciable noise from the construction of the revised scheme. The significance of the identified vibration effects has been assessed on a community basis in combination with the airborne noise also identified at these receptors.
- 14.3.19 The direct construction noise effects on the acoustic character of the areas around the residential communities identified in Table 19 are considered to be significant. The durations of impacts shown in Table 19 at each location are the total number of months in which the relevant significance criteria are forecast to be exceeded. These estimates are conservative for reasons explained in SES2 and AP3 ES Volume 5: Appendix SV-003-001. Construction activities are likely to vary considerably in intensity during these periods. The total durations of impacts estimated are the sums of the different periods within which significant effects are predicted as the various noise-generating works progress through the construction programme. The great majority of the significant effects identified in Table 19 will occur in construction Stage A, with only a small number of locations, south of Granby Terrace Bridge, subject to significant effects in Stage B1 after 2026. The programme of the construction works is summarised in Figures 9a and 9b.

Table 19: Adverse effects of construction noise and vibration that are considered to be significant on a community basis

Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
CSV01-Co2 Park Village East	Construction noise	Day	Approximately 40 dwellings in Cubitt Court, Park Village East.	Demolition of buildings in the station approach, utility diversions, bridge construction, retaining wall construction, earthworks excavation, construction traffic with typical and highest monthly noise levels around 70dB and 80dB.	36 Months
	Construction noise and vibration	Night	Approximately 40 dwellings in Cubitt Court, Park Village East.	Demolition of the carriage shed, construction of new bridge piers with typical and highest monthly noise levels around 60dB and 70dB ¹³³ .	Noise: 36 Months Combined noise and vibration up to 3 Months
	Construction noise	Day	Approximately 65 dwellings in Richmond House, and Goldsmiths House hostel,	Demolition of buildings in the station approach, utility diversions, bridge construction, retaining wall construction, earthworks excavation, construction traffic with typical and highest monthly noise levels around 70dB and 80dB.	12 Months

¹³³ Night-time: equivalent continuous sound level at the facade, $L_{pAeq, 23:00-07:00}$.

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Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
			Park Village East.		
	Construction noise	Night	Approximately 65 dwellings in Richmond House and Goldsmiths House hostel Park Village East.	Demolition of the carriage shed, construction of new bridge piers with typical and highest monthly noise levels around 60dB and 65dB.	30 Months
	Construction noise	Day	Approximately 25 dwellings in Silsoe House, Park Village East and their shared open area.	Demolition of buildings in the station approach, utility diversions, bridge construction, retaining wall construction, earthworks excavation, construction traffic with typical and highest monthly noise levels around 65dB and 80dB.	12 Months
	Construction noise	Night	Approximately 25 dwellings in Silsoe House, Park Village East.	Demolition of the carriage shed, construction of new bridge piers with typical and highest monthly noise levels around 55dB and 65dB.	24 Months
	Construction noise	Day	Approximately 10 dwellings on Park Village East, near Mornington Street Bridge.	Demolition of buildings in the station approach, utility diversions, bridge construction, barrette retaining wall construction, cantilevered road and parapet construction, earthworks excavation, construction traffic with typical and highest monthly noise levels around 80dB and 90dB.	18 Months
	Construction noise and vibration	Night	Approximately 10 dwellings on Park Village East, near Mornington Street Bridge.	Mornington Street Bridge demolition, construction of new bridge piers with typical and highest monthly noise levels around 65dB and 75dB.	Noise: 12 Months Combined noise and vibration: 3 Months
	Construction noise	Day	Approximately 20 dwellings on Park Village East, north.	Utility diversions, barrette retaining wall construction, cantilevered road and parapet construction, earthworks excavation, construction traffic with typical and highest monthly noise levels around 75dB and 85dB.	18 Months

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Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
	Construction noise	Night	Approximately 20 dwellings on Park Village East, north.	Mornington Street Bridge demolition, construction of new bridge piers with typical and highest monthly noise levels around 55dB and 70dB.	6 Months
	Construction noise	Day	Approximately 40 dwellings on Park Village West.	Utility diversions, barrette retaining wall construction, cantilevered road and parapet construction, construction traffic with typical and highest monthly noise levels around 60dB and 70dB.	3 Months
	Construction noise	Night	Approximately 40 dwellings on Park Village West.	Mornington Street Bridge demolition, construction of new bridge piers with typical and highest monthly noise levels around 50dB and 55dB.	11 Months
	Construction noise	Day	Approximately 10 dwellings on Parkway between Delancey Street and Park Village East.	Utility diversions, demolition of existing retaining wall, construction of barrette wall, cantilevered road and parapet construction with typical and highest monthly noise levels around 55dB and 70dB.	18 Months
	Construction noise	Night	Approximately 10 dwellings on Parkway between Delancey Street and Park Village East.	Mornington Street Bridge demolition, bored piling in tunnel portal with typical and highest monthly noise levels around 50dB and 75dB.	30 Months
CSV01-Co3 Mornington Terrace	Construction noise	Day	Approximately 25 dwellings on Delancey Street.	Contiguous piling retaining wall abutments, excavation, barrette wall construction (Park Village East) with typical and highest monthly noise levels around 70dB and 80dB.	12 Months
	Construction noise	Night	Approximately 25 dwellings on Delancey Street.	Contiguous piling near tunnel portal with typical and highest monthly noise levels around 60dB and 75dB.	12 Months
	Construction noise	Day	Approximately 90 dwellings on Mornington Terrace.	Contiguous piling retaining wall abutments, excavation, barrette wall construction (Park Village East) with typical and highest monthly noise levels around 70dB and 80dB.	24 Months

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Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
	Construction noise and vibration	Night	Approximately 90 dwellings on Mornington Terrace.	Mornington Street Bridge demolition, construction of new bridge piers with typical and highest monthly noise levels around 60dB and 75dB.	Noise: 30 Months Combined noise and vibration: 3 Months
	Construction noise	Day	Approximately 25 dwellings on Mornington Place.	Contiguous piling retaining wall abutments, excavation, barrette wall construction at Park Village East with typical and highest monthly noise levels around 65dB and 80dB.	24 Months
	Construction noise	Night	Approximately 25 dwellings on Mornington Place.	Mornington Street Bridge demolition, construction of new bridge piers with typical and highest monthly noise levels around 55dB and 65dB.	24 Months
	Construction noise	Day	Approximately 25 dwellings on Mornington Crescent.	Demolition of the carriage shed and buildings in the station approach, earthworks, demolition and construction of Granby Terrace Bridge and Hampstead Road Bridge. with typical and highest monthly noise levels around 65dB and 75dB.	18 Months
	Construction noise	Night	Approximately 25 dwellings on Mornington Crescent.	Bridge demolitions, construction of new bridge piers, installation of bridge trusses and precast planks with typical and highest monthly noise levels around 60dB and 70dB.	Noise: 24 Months Combined noise and vibration: 3 Months
CSV01-Co4 Ampthill Estate	Construction noise	Day	Approximately 80 dwellings in Gillfoot, Ampthill Estate, and their shared open area.	Utility diversions, demolition of buildings in the station approach, construction of Granby Terrace and Hampstead Road bridges with typical and highest monthly noise levels around 70dB and 80dB.	24 Months
	Construction noise	Night	Approximately 80 dwellings in Gillfoot, Ampthill Estate.	Removal of Granby Terrace and Hampstead Road bridge decks and piers, construction of bridge structures with typical and highest monthly noise levels around 70dB and 80dB.	Noise: 24 Months Combined noise and vibration: 1 Month
	Construction noise	Day	Approximately 160 dwellings in Dalehead and	Utility diversions, demolition of buildings in the station approach, construction of Granby Terrace and Hampstead Road Bridges with typical	6 Months

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Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
			Oxenholme, Ampthill Estate.	and highest monthly noise levels around 70dB and 80dB.	
	Construction noise	Night	Approximately 80 dwellings in Dalehead, Ampthill Estate.	Removal of Granby Terrace and Hampstead Road Bridge decks and piers, construction of bridge structures with typical and highest monthly noise levels around 65dB and 75dB.	12 Months
	Construction noise	Day	Approximately 70 dwellings on Ampthill Square and their shared open area.	Utility trenching, demolition of buildings in the station approach, excavation, construction of new bridge with typical and highest monthly noise levels around 65dB and 75dB.	24 Months
	Construction noise	Night	Approximately 50 dwellings on Ampthill Square.	Construction of new bridge piers, trusses and precast decks with typical and highest monthly noise levels around 60dB and 70dB.	12 Months
CSV01-Co5 Cobourg Street	Construction noise and vibration	Day	Approximately 40 dwellings on Cobourg Street and side streets.	Utility trenching, demolition of buildings in Melton Street and Cardington Street, construct barrette retaining walls and abutments, major earthworks. with typical and highest monthly noise levels around 75dB and 85dB.	Noise: 60 Months Combined noise and vibration: 2 Months
	Construction noise	Evening	Approximately 40 dwellings on Cobourg Street and side streets.	Retaining walls and abutments with typical and highest monthly noise levels around 65dB and 75dB ¹³⁴ .	12 Months
	Construction noise	Night	Approximately 40 dwellings on Cobourg Street and side streets.	Bridge construction with typical and highest monthly noise levels around 45dB and 55dB.	12 Months
	Construction noise	Day	Approximately 60 dwellings on Starcross Street and side streets.	Utility trenching, demolition of buildings in Melton Street and Cardington Street, construct barrette retaining walls and abutments, major earthworks with typical and highest monthly noise levels around 70dB and 75dB.	24 Months

¹³⁴ Evening: equivalent continuous sound level at the facade, $L_{pAeq, 19:00 - 23:00}$.

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Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
CSV01-Co6 Regent's Park Estate	Construction noise	Day	Approximately 60 dwellings in Augustus House and Tintern House, Stanhope Street.	Utility trenching, demolition of Eskdale and buildings in the station approach, on site traffic, major excavation, bridge construction with typical and highest monthly noise levels around 70dB and 85dB.	60 Months
	Construction noise	Night	Approximately 60 dwellings in Augustus House and Tintern House, Stanhope Street.	Installation of bridge demolition deck, construction of new bridge pier, installation of temporary supports, trusses & precast planks with typical and highest monthly noise levels around 60dB and 70dB.	Noise: 48 Months Combined noise and vibration: 2 Months
	Construction noise and vibration	Day	Approximately 80 dwellings in Langdale and Coniston, Harrington Street.	Utility trenching, demolition of Ainsdale, Silverdale and buildings in the station approach, major earthworks, barrette retaining wall construction, construction of new bridge and carriageway with typical and highest monthly noise levels around 70dB and 85dB.	Noise: 56 Months Combined noise and vibration: 2 Months
	Construction noise	Evening	Approximately 80 dwellings in Langdale and Coniston, Harrington Street.	Construction of barrette retaining walls and abutments with typical and highest monthly noise levels around 65dB and 70dB.	Noise: 12 Months Combined noise and vibration: 2 Months
	Construction noise	Night	Approximately 80 dwellings in Langdale and Coniston, Harrington Street.	Installation of bridge demolition deck, construction of new bridge pier, installation of temporary supports, trusses and precast decks with typical and highest monthly noise levels around 65dB and 70dB.	Noise: 56 Months Combines noise and vibration: 2 Months
	Construction noise and vibration	Day	Approximately 70 dwellings in Cartmel, Hampstead Road.	Utility trenching, demolition of Silverdale and buildings in the station approach, major earthworks, barrette retaining wall construction, construction of new bridge and carriageway with typical and highest monthly noise levels around 70dB and 85dB.	Noise: 24 Months Combined noise and vibration: 3 Months
	Construction noise and vibration	Evening	Approximately 70 dwellings in Cartmel,	Construction of barrette retaining walls and abutments with typical and highest	Noise: 12 Months

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Significant effect number (see SES2 and AP3 Volume 5 Appendix SV-003-001)	Type of significant effect	Time of day	Location	Cause (noisiest construction activities)	Likely duration of impact
			Hampstead Road.	monthly noise levels around 70dB and 85dB.	Combined noise and vibration: 3 Months
	Construction noise	Night	Approximately 70 dwellings in Cartmel, Hampstead Road.	Installation of bridge demolition deck, construction of new bridge piers, installation of temporary supports, trusses and precast decks with typical and highest monthly noise levels around 60dB and 70dB.	Noise: 6 Months Combined noise and vibration: 3 Months
	Construction noise	Day	Approximately 30 dwellings in The Tarns, Hampstead Road.	Utility trenching, demolition of buildings in the station approach, major earthworks, barrette retaining wall construction, construction of new bridge and carriageway with typical and highest monthly noise levels around 70dB and 80dB.	40 Months
	Construction noise	Day	Approximately 55 proposed replacement dwellings adjacent to Rydal Water and Newlands on Hampstead Road.	Utility trenching, demolition of buildings in the station approach, major earthworks, barrette retaining wall construction, construction of new bridge and carriageway with typical and highest monthly noise levels around 70dB and 80dB.	Noise: 30 Months Combined noise and vibration: 3 Months

Residential receptors: indirect effects

- 14.3.20 Construction road traffic associated with the revised scheme will generate airborne noise. In the Euston area road traffic management measures on some roads will divert public traffic and construction traffic to other roads (for further information please refer to Section 15: Traffic and transport). These two changes to road traffic patterns have been assessed to estimate noise changes on roads in the area.
- 14.3.21 Increases in local road traffic as a result of construction of the revised scheme is likely to cause significant adverse noise effects on residential receptors along the following local roads during construction Stage A:
- Albert Street/Mornington Place (CSV01-C03) in the 2017 and 2018 assessments;
 - Bidborough Street and Cartwright Gardens (CSV01-C05) in the 2023 assessment;
 - Mornington Crescent and Mornington Place (CSV01-C03) in the 2018 assessment;

- Robert Street, (CSV01-Co6) in the 2018 and 2023 assessments; and
- Varndell Street (CSV01-Co6) in the 2018 and 2023 assessments.

14.3.22 These adverse effects¹³⁰ will be a change in the acoustic character of the area such that there is a perceived change in the quality of life and are considered significant when assessed on a community basis taking account of the local context¹³¹.

Non-residential receptors: direct effects

14.3.23 The area around the Euston works has various non-residential and commercial receptors, many of which are already exposed to high levels of road traffic noise. The assessment of potential noise effects incorporates consideration of baseline sound levels, and, in many cases, construction noise effects are not expected because construction noise will not increase these. There are also many non-residential and commercial receptors on roads where utilities works will be carried out, where noise impacts will be too short, less than one month, to result in a significant effect¹³⁵.

14.3.24 The assessment of effects on non-residential receptors has been undertaken on a reasonable worst-case basis. Further information can be found in SES2 and AP3 ES Volume 5: Appendix SV-003-001.

14.3.25 Significant construction noise or vibration effects have been identified on a reasonable worst-case basis on the following non-residential receptors:

- Park Village Studio on Park Village East (CSV01-No1) – noise from a range of works including utility trenching, barrette construction, pile cap breaking and cantilevered road construction over a period of up to five years;
- the Maverick TV Studio on Churchway (CSV01-No2) noise, if utilities are diverted on Churchway, the daytime impact criteria may be exceeded only briefly during utility works, but given the sensitivity of the building this may be significant for less than one month;
- offices in Cobourg Street (CSV01-No3) – noise for up to six months combined with vibration for up to two months, due to a range of works including demolitions a new utility corridor, barrette pile construction and major earthworks;
- the Exmouth Arms Public House in Starcross Street (CSV01-No4) – noise for up to 24 months combined with vibration for up to two months, due to a range of works including demolitions, utility works, barrette pile construction and major earthworks;
- the Euston Mosque in Starcross Street (CSV01-No5) – noise for up to five years due to a range of works including demolitions, utility works, barrette pile construction and major earthworks;
- the NHS Centre and Maria Fidelis Convent School in North Gower Street (CSV01-No6 and CSV01-No7) – noise for up to five months at the NHS Centre and seven years at the school due to a range of works including demolitions, a

¹³⁵ Noise from works will be kept to a reasonably practicable minimum through implementation of the CoCP.

new utility corridor, barrette piling of retaining walls, major earthworks, and bridge construction;

- the Regent's Park Children's Centre nursery in Augustus Street (CSV01-No8) – noise for a period of up to five years due to a range of works including demolitions, utility works, major earthworks, and bridge construction;
- the School of Arts on Euston Road (CSV01-No9) – noise for a period of up to three months due to construction of the temporary bridge on Euston Road;
- the Royal College of General Practitioners offices at 1-9 Melton Street (CSV01-N10) – noise for a period of eight to 13 months combined with vibration for up to 2 months due to a range of activities including demolition of buildings in the station approach, construction of a new utilities corridor and bored piling;
- the Surma Community Centre on Robert Street (CSV01-N11) – noise for a period of three years due to utilities diversions, demolitions, earthworks and construction of Hampstead Road Bridge;
- offices facing onto Stephenson Way (CSV01-N12) – noise for a period of three months, due to utilities diversions in Stephenson Way;
- the Magic Circle, Royal Asiatic Society and offices in Stephenson Way facing onto Regnart Buildings (CSV01-N13) – noise for a period of two years combined with vibration for up to 2 months, due to demolition of Wolfson House, bored piling and construction of the LU ventilation shaft;
- the Wesley Hotel on Euston Street (CSV01-N14) – noise for a period of up to four years combined with vibration for up to two months, due to demolition of Wolfson House, bored piling and construction of the LU ventilation shaft and station construction;
- shops and commercial properties in Drummond Street and Euston Street (CSV01-N15, CSV01-N16) – noise for up to 18 months, combined with vibration for up to two months, due to demolitions, utilities and station construction;
- commercial space on the ground floor of the proposed Rydal Water and Newlands replacement housing blocks on Hampstead Road (CSV01-N17 and CSV01-N18) – noise for up to seven months combined with vibration for up to two months due to construction of the approaches to Hampstead Road Bridge; and
- the York and Albany Hotel on Parkway (CSV01-N19) – noise for a period of up to two years due to construction traffic and activities on Park Village East.

Non-residential receptors: indirect effects

14.3.26 Increases in local road traffic as a result of construction of the revised scheme is likely to cause significant indirect noise effects at non-residential receptors along the following local roads:

- Albert Street/Mornington Place;
- Bidborough Street and Cartwright Gardens;

- Granby Terrace;
- Mornington Crescent and Mornington Place;
- Robert Street; and
- Varndell Street.

14.3.27 Although most of the buildings on these roads are residential, the following non-residential receptors have been identified and, on a reasonable worst-case basis, are forecast to be significantly affected:

- the conference centre (CSVo1-N20), the Jewish Museum (CSVo4-N21) and Friends of the Hebrew University (CSVo4-N22) on Albert Street, in the 2017 and 2018 assessments; and
- the dental surgery (CSVo4-N23) on Robert Street, in the 2018 and 2023 assessments.

Stage B1 (2026–2033) combined noise effects from both construction and operation

14.3.28 After 2026 a permanent significant adverse noise effect is predicted in the area around Langdale in the Regent's Park Estate, as described in Section 14.4. There are periods totalling approximately four months during Stage B1 where temporary construction noise effects are forecast that are also considered to be significant in this area when assessed on a community basis. During these periods, a combined construction and operational noise significant effect is forecast in this area.

14.3.29 Elsewhere, where construction noise effects arise from the limited extent of noise-generating construction works in Stage B1, any adverse permanent effects on residential dwellings due to operation of the revised scheme are likely to be negligible and consequently will not combine to give rise to additional significant temporary effects.

Cumulative effects from the revised scheme and other committed development

14.3.30 This assessment has considered the potential cumulative construction noise effects of the revised scheme and other committed developments. In this area, the main committed developments are too far from the noise sensitive receptors that overlook, and may be affected by noise from, the construction works associated with the revised scheme to add significantly to noise impacts from the revised scheme. Accordingly, construction noise or vibration from the revised scheme is unlikely to result in any significant cumulative noise effects.

Summary of likely residual significant effects (construction 2017–2033)

14.3.31 The identified avoidance and mitigation measures reduce noise inside all dwellings from the construction activities such that it does not reach a level where it will significantly affect¹³⁰ residents.

14.3.32 Levels of ground vibration are forecast to give rise to significant effects on building occupants, for durations of up to three months, in Mornington Terrace, Gillfoot in

Amphill Estate, Cobourg Street, Euston Street, and Cartmell on Hampstead Road. HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid significant ground-borne noise and vibration effects, for example through the use of alternative construction methods.

14.3.33 The measures also reduce the construction noise and vibration effects on acoustic character in the majority of residential communities. Despite these measures, the effects on the acoustic character in the following local residential community areas are considered to be significant:

- Park Village East;
- Mornington Terrace and parts of Mornington Place and Crescent;
- Amphill Estate;
- Cobourg Street; and
- Regent's Park Estate including Cartmel, Coniston and Langdale, and the proposed Rydal Water and Newlands residential blocks.

14.3.34 On a reasonable worst-case basis, noise from specific construction activities has been identified as resulting in significant residual effects on the following non-residential properties:

- Park Village Studio on Park Village East;
- The Maverick TV Studio on Churchway;
- offices in Cobourg Street;
- The Exmouth Arms Public House in Starcross Street;
- The Euston Mosque in Starcross Street;
- The NHS Centre and Maria Fidelis Convent School in North Gower Street;
- The Regent's Park Children's Centre nursery in Augustus Street;
- The School of Arts on Euston Road;
- The Royal College of General Practitioners offices in Melton Street;
- The Surma Community Centre on Robert Street;
- offices facing onto Stephenson Way;
- The Magic Circle, Royal Asiatic Society and offices in Stephenson Way facing onto Regnart Buildings;
- The Wesley Hotel on Euston Street;
- shops and commercial properties in Drummond Street and Euston Street;
- commercial space on the ground floor of the proposed Rydal Water and Newlands replacement housing buildings on Hampstead Road; and
- The York and Albany Hotel on Parkway.

- 14.3.35 It is likely that by applying the BPM specific to each site, the direct effects will be reduced.
- 14.3.36 Increases in local road traffic on Robert Street, Albert Street north of Mornington Street, Bidborough Street, Cartright Gardens, Granby Terrace, Varndell Street, Mornington Crescent and Mornington Place as a result of construction of the revised scheme are likely to cause significant noise effects on adjacent residential and non-residential receptors.
- 14.3.37 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects. In doing so, HS2 Ltd will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the measures. The outcome of these activities will be appropriately reflected in the Environmental Minimum Requirements.

14.4 Operational effects arising during Stage B1 construction and operation (2026–2033) and operation (2033 onwards)

Local assumptions and limitations

Local assumptions—service pattern

- 14.4.1 The effects of noise and vibration from the operation of the revised scheme have been assessed based on the highest likely train flows, including the HS2 Phase Two services. Trains are expected to be 400m long during peak hours and a mix of 200m and 400m long trains at other times. The assessment assumes that there will be no changes to the timetables and other characteristics of the conventional trains operating into and out of Euston station.
- 14.4.2 The expected passenger service frequency for high speed train services is described in the main ES Volume 1¹³⁶. As a reasonable worst case, this assessment is based upon the service pattern for Monday to Saturday for Phase One and Phase Two services. Passenger services will start at or after 05:00 from the terminal stations and in this area will progressively increase to the number of tph in each direction on the main lines set out in Table 20. This number of services is assumed to operate every hour from 07:00 to 21:00. The number of services will progressively decrease after 21:00 and the last service will arrive at terminal stations by 24:00. Train speeds are shown in Table 20.

Table 20: Train flows and speeds

Description of line	Time period for peak daytime flows	Number of tph in each direction Phase Two services (Phase One only tph in each direction is set out in brackets)	Speed
Main line between London and the north	07:00-21:00	18 (14)	110 kph, with speeds reducing toward Euston station.

¹³⁶ The change in noise and vibration effects between the different passenger services is assessed in Volume 1.

Local assumptions–tunnelled sections

- 14.4.3 It is likely that mechanical ventilation equipment for the tunnels will only operate for limited testing periods during the daytime¹³⁷, or in the event of an emergency. Consequently, any operational noise effects will be of limited duration and are unlikely to be significant.

Local assumptions–replacement residential blocks

- 14.4.4 It is assumed that the replacement residential buildings at Newlands and Rydal Water on Hampstead Road will be designed to control road traffic noise ingress from Hampstead Road, such that it will not reach a level where it would significantly affect residents.

Avoidance and mitigation measures

Airborne noise

- 14.4.5 High speed trains will be quieter than the relevant current European Union specifications. The track will be specified to reduce noise, as will the maintenance regime. Further information is provided in the main ES Volume 5: Appendix SV-001-000.
- 14.4.6 The solid containment and safety barriers included on the rebuilt Hampstead Road Bridge will reduce the effect of noise from road traffic noise on the Regent’s Park Estate. Barrier locations are shown on Map Series SV-02 (SES2 and AP3 Volume 5, Sound, Noise and Vibration Map Book).
- 14.4.7 Permanent noise effects are avoided or reduced in other locations along the high speed railway, for example along Park Village East by the new retaining walls for the railway cutting and their parapets. The location of these barriers is shown on Map Series SV-05 (SES2 and AP3 Volume 5 Map Book).
- 14.4.8 Significant noise effects from the operational static sources such as mechanical ventilation located at tunnel portals and in the approach, and line-side equipment, will be avoided through their design and the specification of noise emission requirements (for further information please see the main ES Volume 5: Appendix SV-001-000).
- 14.4.9 Noise insulation measures will be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996¹³⁸ (the Regulations). The assessment reported in this section provides an estimate of the buildings that are likely to qualify under the Regulations. Qualification for noise insulation under the Regulations will be identified and noise insulation offered at the time that the revised scheme becomes operational.
- 14.4.10 Where required, as well as improvements to the noise insulation of windows facing the railway, ventilation will be provided so that windows can be kept closed to protect internal sound levels.

¹³⁷ For example, HS1 ventilation shaft fans are tested monthly.

¹³⁸ Her Majesty’s Stationery Office, (1996), *The Noise Insulation (Railways and Other Guided Transport Systems) Regulations*, London.

- 14.4.11 Following the Government’s National Planning Practice Guidance¹³⁹, where the night-time operational sound level from the revised scheme measured outside a dwelling exceeds the Interim Target defined by the WHO Night Noise Guidelines for Europe¹⁴⁰, residents are considered to be significantly affected by the resulting noise inside their dwelling. The effect on people at night due to the maximum sound level as each train passes has also been assessed¹⁴¹. The Interim Target is a lower level of noise exposure than the Regulations trigger threshold for night noise. In these particular circumstances, where night-time noise levels from operation of the revised scheme are predicted - following the methodology set out in the Regulations - to exceed 55dB¹⁴², or if the maximum noise level as a train passes exceeds the criterion¹⁴¹, noise insulation will be offered for these additional buildings.

Ground-borne noise and vibration

- 14.4.12 Significant ground-borne noise or vibration effects will be avoided or reduced through the design of the track and trackbed.

Assessment of impacts and effects

Residential receptors: direct effects – individual dwellings

- 14.4.13 In this area the assessment has identified one residential building, Cartmel, near Hampstead Road, represented by receptor 535446, where noise from the revised scheme would exceed the daytime trigger threshold set in the Noise Insulation Regulations 1975. As the overall sound levels at the receptor are not forecast to change by 1dB or more, this building would be unlikely to qualify for noise insulation as a result of the Regulations. However, as the forecast night-time noise level would exceed the World Health Organisation’s Interim Target of 55dB, it is estimated that these buildings will be offered noise insulation.
- 14.4.14 The predicted operational airborne sound levels at this assessment location are presented in main ES Appendix SV-004-001. This building is shown on AP3 ES Map series SV-02 (Volume 5, Sound, Noise and Vibration Map Book).

Residential receptors: direct effects - communities

- 14.4.15 The avoidance and mitigation measures will avoid airborne noise adverse effects on the majority of receptors and at the following communities:
- Ampthill Estate;
 - along Mornington Terrace; and
 - along Park Village East.
- 14.4.16 Taking account of the envisaged mitigation, Map Series SV-02 (SES2 and AP3 Volume 5, Sound, Noise and Vibration Map Book) shows the long term 40dB¹⁴³ night-time

¹³⁹ National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk>

¹⁴⁰ World Health Organization, Night-time Noise Guidelines for Europe, 2010.

¹⁴¹ During the night (2300-0700) a significant effect is also identified where the revised scheme results in a maximum sound level at the façade of a building at or above: 85 dB LpAFmax (where the number of train pass-bys exceeding this value is less than or equal to 20); or 80 dB LpAFmax (where the number of train pass-bys exceeding this value is greater than 20).

¹⁴² Equivalent continuous level, L_{pAeq,23:00-07:00} measured without reflection from the front of buildings.

¹⁴³ Defined as the equivalent continuous sound level from 23:00 to 07:00 or L_{pAeq}, at night).

sound level contour from the operation of trains on the revised scheme. The extent of the 40dB night-time sound level contour is equivalent to, or slightly larger than, the 50dB daytime contour¹⁴⁴. In general, below these levels, adverse effects are not expected.

- 14.4.17 Above 40dB during the night and 50dB during the day the effect of noise is dependent on the baseline sound levels in that area and the change in sound level (magnitude of effect) brought about by the revised scheme. The airborne noise impacts and effects forecast for the operation of the scheme are presented on Map Series SV-02 (SES2 and AP3 Volume 5, Sound, Noise and Vibration Map Book).
- 14.4.18 Changes in noise levels are likely to affect the acoustic character of an area such that there may be a perceived change in the quality of life. These effects are considered to be significant when assessed on a community basis taking account of the local context.
- 14.4.19 The direct adverse effects¹³⁰ on the areas of the residential communities identified in Table 21 are considered to be significant.

Table 21: Adverse effects of operational noise and vibration that are considered to be significant on a community basis

Significant effect number (see Map series SV-05)	Source of significant effect	Time of day	Location and details
OSV01-Co1	Airborne noise increase from new road traffic on the realignment of Hampstead Road.	Daytime and night-time	Forecast increases in sound due to operation of the revised scheme are likely to cause a moderate adverse effect on the acoustic character of the area around Langdale and the adjacent open spaces, and a minor adverse effect around Augustus House and Coniston and their adjacent shared community open areas. These buildings are located in the Regent's Park Estate.

Residential receptors: indirect effects

- 14.4.20 Changes in road traffic due to the operation of the revised scheme, set out in Section 15: Traffic and transport, are likely to create beneficial noise effects on residential receptors along Cardigan Street (OSV01-Co3) where a reduction in outdoor noise levels of approximately 5dB is forecast due to reorientation of traffic routes in this area.
- 14.4.21 Changes in road traffic due to the revised scheme, set out in Section 15, are likely to cause permanent adverse noise effects on residential receptors along the following local roads where an overall increase in outdoor noise levels of around 10dB is forecast¹⁴⁵:
- Cobourg Street (OSV01-Co4); and
 - a section of Euston Street between Stephenson Way and Cobourg Street

¹⁴⁴ With the train flows described in the assumptions section of this CFA Report, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or LpAeq,day) from the Revised scheme would be approximately 10dB higher than the night-time sound level. The 40dB contour therefore indicates the distance from the revised scheme at which the daytime sound level would be 50dB.

¹⁴⁵ The increase in traffic noise on these roads is around 12dB, but the sound level at the adjacent dwellings is not currently dominated by the traffic flow on this road.

(OSV01-Co4).

- 14.4.22 The changes in noise levels resulting from these changes in road traffic are likely to affect the acoustic character of the area, such that there is a perceived change in the quality of life.
- 14.4.23 These effects are considered significant when assessed on a community basis taking account of the local context.

Non-residential receptors: direct effects

- 14.4.24 The assessment of operational noise and vibration indicates that significant direct effects are unlikely to occur on non-residential receptors in this area.

Non-residential receptors: indirect effects

- 14.4.25 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

Summary of likely residual significant effects (operation 2026 onwards)

- 14.4.26 The mitigation measures reduce noise inside all dwellings such that it does not reach a level where it would significantly affect residents.
- 14.4.27 The avoidance and mitigation measures in this area will avoid noise and vibration adverse effects¹³⁰ on the majority of receptors and communities including shared open areas.
- 14.4.28 The residual permanent beneficial effects on the acoustic character of the communities that result from reduced noise levels at Cardigan Street due to road closures are considered significant.
- 14.4.29 Taking account of the avoidance and mitigation measures and the local context, the residual permanent adverse noise effects on the acoustic character of the Regent's Park Estate community in the vicinity of Langdale, Augustus House, Coniston and Cubitt Court, including their adjacent shared community open areas, are considered significant.
- 14.4.30 The residual permanent adverse noise effects, due to increases in traffic, in part of Cobourg Street and part of Euston Street are considered significant.
- 14.4.31 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid the adverse significant effects. In doing so, HS2 Ltd will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the measures. The outcome of these activities will be appropriately reflected in the Environmental Minimum Requirements.

15 Traffic and transport

15.1 Introduction

- 15.1.1 This section describes the likely impacts on all forms of transport and the consequential effects on transport users arising from the construction and operation of the revised scheme within the Euston station and the station approach area.
- 15.1.2 With regard to traffic and transport, the main issues are the impacts of construction traffic, changes in passenger movements through Euston station (both high speed and conventional) and their impact on onward modes of transport. These include National Rail, LU services, buses, walking, cycling, taxi and private vehicle pick up/set down movements and increased traffic as a result of implementation of the revised scheme, road diversions, temporary and permanent road closures, and temporary and permanent diversions or closure of paths used by the public.
- 15.1.3 The effects on traffic and transport have been assessed quantitatively, based on baseline traffic and passenger conditions and future projection scenarios.
- 15.1.4 A detailed report on traffic and transport and surveys undertaken within the area is contained in the main ES, Volume 5 Appendix TR-001-000 and the SES2 and AP3 Volume 5 Appendix TR-001-000.
- 15.1.5 The location of the key transport infrastructure can be found on Figure 1.
- 15.1.6 Engagement has been undertaken with the key transport authorities including TfL, NR and LBC.

15.2 Scope, assumptions and limitations

- 15.2.1 The assessment scope, key assumptions and limitations for the traffic and transport assessment are set out in Volume 1, the SMR (Appendix CT-001-000/1), the SMR Addendum (Appendix CT-001-000/2) of the main ES, and the SMR Addendum 3 (Appendix CT-001-000/4) of the SES2 and AP3 ES. This report follows the standard assessment methodology defined in these documents, including the assessment of combined construction and operation effects.
- 15.2.2 The study area includes the area around Euston station, although the highway assessment covers the detailed area within TfL's CLoHAM, corresponding to an area from Limehouse in the east to Hammersmith in the west and from Hampstead Heath in the north to Clapham in the south. The public transport assessment is similarly focussed on the area around the existing Euston station but also covers the wider London public transport network as represented within TfL's Railplan model.
- 15.2.3 TfL's transport modelling tools have been used to inform the assessment namely the LTS, and Railplan model for public transport and CLoHAM for highways. The models have been updated for this assessment. The Railplan model uses long distance rail demand (including HS2 demand) from the DfT's PLANET Modelling Framework¹⁴⁶.

¹⁴⁶ The versions of the model used in the assessment are LTS v7, Railplan v7 model, CLoHAM Production Version 3 and DfT's PLANET Modelling Framework Version 4.

The CLoHAM model includes a detailed road network with the inclusion of a number of additional roads in the vicinity of Euston station.

- 15.2.4 The time periods available in these tools means that the public transport assessment covers the weekday AM peak period (07:00-10:00) and PM peak period (16:00-19:00), while the highway assessment covers the AM (08:00-09:00) and PM (17:00-18:00) peak hours. All references to the AM and PM peak in this chapter relate to a three hour period for public transport and a one hour period for highways.
- 15.2.5 The combined impacts and effects from construction of HS2 associated with B509 Adelaide Road (CFA3, Primrose Hill to Kilburn) have been included in the assessment in this CFA. Where the activity in CFA1 affects adjacent CFAs, these are identified in this assessment for completeness but the effects are reported in the relevant CFA report.
- 15.2.6 The impact of construction traffic has been assessed on the assumption that all excavated material from worksites will be removed by road. The potential to use rail is being investigated, which would reduce the impacts of construction traffic.

15.3 Environmental baseline

Existing Baseline

- 15.3.1 Existing conditions in the vicinity of Euston station have been determined through site visits, specially commissioned transport surveys and liaison with TfL and other stakeholders to source transport models and accident data. All transport modes have been surveyed including private vehicles, public transport, walking, cycling and taxis, with the data supplemented by information from TfL, NR and DfT.
- 15.3.2 Traffic surveys of all roads in the vicinity of Euston station were undertaken in June and July 2012 with further supplementary surveys in June 2014. These were supplemented by traffic and transport data obtained from other sources where available, including from TfL. The highway peak hours in the study area were identified as 08:00-09:00 and 17:00-18:00.
- 15.3.3 Public footpath surveys were undertaken in September 2012 to establish their usage by pedestrians and cyclists (non-motorised users). The surveys included all footpaths used by the public, roads that will cross the route of the revised scheme and any additional footpaths used by the public and roads that will be affected by the revised scheme. Pedestrian counts were also undertaken inside and at the entrances to the station.
- 15.3.4 CFA1 contains the following paths used by the public, which have been treated in the same way as PRoW for the purposes of the ES:
- the path between A400 Hampstead Road leading into St James's Gardens;
 - a section of the path on the pedestrian section of Harrington Street; and
 - two paths across Euston Square Gardens (one to the east and one to the west).
- 15.3.5 There are several strategic routes that pass through the area. Euston station lies immediately north of the A501 Euston Road, which is part of the TfL Road Network, owned and maintained by TfL. The station is bounded by A501 Euston Road to the

south, A4200 Eversholt Street to the east and A400 Hampstead Road to the west. Roads around Euston station carry a significant amount of traffic as well as pedestrian flows. The A501 Euston Road is currently subject to delays and congestion at peak times.

- 15.3.6 Euston station has 216 basement public car park spaces, but with relatively low utilisation. In addition, there are 326 staff parking spaces located on the parcels deck, the majority of which are allocated to train operating companies and other service companies including catering, engineering and station facility providers. On-street parking is present on surrounding streets comprising resident permit holders, pay and display, motorcycle bays, disabled spaces, loading bays, car club bays and taxi parking.
- 15.3.7 Euston station generates approximately 340 combined two-way service and delivery vehicle movements per day to support its function as a station and its ancillary services including retail and catering services.
- 15.3.8 Relevant accident data for the road network subject to assessment has been obtained from TfL for the three year period from 2009 to 2011. This has been assessed with any clusters identified and examined.
- 15.3.9 Euston station is served by 12 public bus routes, with the majority of routes serving Euston bus station including four terminating routes. These services provide a maximum combined service frequency of 127 buses per hour between Monday and Friday. There are also a number of routes passing through the area around Euston station on A501 Euston Road, A4200 Eversholt Street and A400 Hampstead Road.
- 15.3.10 There is one existing coach bay on the west side of the railway station on Cardington Street opposite the Ibis Hotel Euston.
- 15.3.11 There are a number of LCN routes on streets around Euston. Surveys undertaken in July 2012 indicated a tidal flow of cyclists from Euston station. The surveys indicate that the majority of onward cycle trips across the whole day are to the south of A501 Euston Road, with the highest proportion heading in a south-east direction towards Holborn and the City. Cycle demand is higher during the weekday peak hours than the Saturday peak hours.
- 15.3.12 There are 310 cycle parking spaces at Euston station, which are provided in four cycle parking areas using a mixture of two-tier stands and Sheffield stands¹⁴⁷. A survey of cyclists at the station recorded a total of approximately 190 combined two-way cycle movements into and out of the station in the AM peak hour.
- 15.3.13 Euston station provides main line NR commuter and intercity services and direct interchange with LU Victoria line and Northern line (Bank and Charing Cross branches) services, buses and taxis. The average number of existing NR passengers per day is 65,170 from trains and 67,720 to trains¹⁴⁸.

¹⁴⁷ Sheffield Stands are a design of cycle parking stand, a metal loop secured at ground level, which can be used to secure up to two bikes.

¹⁴⁸ Source for this and the following table, Central London arrivals and departures by rail in on a typical autumn weekday, by station and time band: 2012. (<https://www.gov.uk/government/organisations/departments-for-transport/series/rail-statistics>) accessed: 2 October 2013.

- 15.3.14 As shown in Table 22, some 24,680 passengers alight from existing NR services in the AM peak three hour period, with 11,580 of those in the peak hour. In the PM peak three hour period, some 23,980 board with 9,030 of those in the peak hour.

Table 22: Existing NR passenger demand at Euston station

	AM peak period 07:00-10:00	AM peak hour 08:00-09:00	PM peak period 16:00-19:00	PM peak hour 18:00-19:00
From trains	24,680	11,580	11,530	4,100
To trains	8,510	3,380	23,980	9,030

- 15.3.15 The main entrance to Euston underground station is in the Euston station concourse, with a secondary access via an underground footway from existing platforms 8 to 11 and a stair and lift connection adjacent to the existing ticket office. The surface level pedestrian movements outside the station include people walking to nearby destinations, interchanging with bus services and taxis and also street level links with the Circle, Hammersmith & City and Metropolitan line underground services at Euston Square underground station. Pedestrians wishing to interchange between Euston and Euston Square underground stations have to cross a busy junction with Melton Street.

- 15.3.16 Some 12,700 passengers interchange from existing NR services to LU services (Euston and Euston Square underground stations) in the AM peak period (three hours), with nearly 6,000 of those in the AM peak hour, as shown in Table 23.

Table 23: London Underground passenger movements at Euston station to and from NR services¹⁴⁹

	AM peak period 07:00-10:00	AM peak hour 08:00- 09:00	PM peak period 16:00-19:00	PM peak hour 18:00- 19:00
From trains				
To Northern line	6,490	3,010	2,420	1,000
To Victoria line	3,410	1,440	3,160	1,390
To Euston Square	2,790	1,540	720	340
Total	12,700	5,990	6,300	2,729
To trains				
From Northern line	1,350	420	6,140	2,640
From Victoria line	2,130	830	4,430	1,580
From Euston Square	550	150	2,160	730

¹⁴⁹ Source: TfL Survey Data 2010 (Arup analysis).

	AM peak period 07:00-10:00	AM peak hour 08:00- 09:00	PM peak period 16:00-19:00	PM peak hour 18:00- 19:00
Total	4,030	1,390	12,740	4,950

- 15.3.17 Euston station and Euston underground station have been assessed on the basis of current usage levels, which highlight a range of existing congestion issues.
- 15.3.18 In the AM peak, escalator capacity constraints are identified in Euston underground station, on both the main access route within the mainline station concourse and on the primary route to the southbound Victoria line and Northern line (Bank branch) platforms. These result in both high congestion levels within Euston underground station and occasional periods of queuing within the Euston station concourse.
- 15.3.19 Station management is used to address the congestion within Euston underground station and maintain safe operations when necessary. This restricts station entries from concourse level which can exacerbate queuing at this location.
- 15.3.20 In the PM peak, the limited waiting area available within the existing Euston station concourse can lead to passenger densities above recommended levels. Escalator usage from northbound Victoria line and Northern line (Bank branch) platforms during the PM peak is also close to capacity, which can cause queuing and delay to exit the platform level.
- 15.3.21 There are no navigable waterways in the area that will be affected by the revised scheme and this aspect is not considered further in this assessment.

Future baseline

- 15.3.22 Future demand was provided by TfL, based on the LTS, which assumes population and employment growth predicted in the London Plan, together with consented highway and public transport schemes (TfL's 'Reference Case')¹⁵⁰. The LTS forecasts also include an uplift to reflect the view of growth in rail travel considered likely.
- 15.3.23 Growth in public transport passenger numbers has been derived from TfL's Railplan model for 2026 and 2041, which is based on public transport demand from LTS but includes long-distance rail demand from DfT's PLANET model. Railplan forecasts were not available for the scheme for 2021. Future baseline traffic volumes for the years of assessment 2021, 2026 and 2041, have been derived from TfL's CLoHAM traffic model.

Construction (2017-2026)

- 15.3.24 Individual construction activities by road in the period 2017 to 2026 have been assessed against the 2021 baseline traffic flows and those in the period 2026 to 2033 against 2026 baseline traffic flows, irrespective of when they occur during the construction period.
- 15.3.25 Local future baseline traffic volumes in the AM peak hour are forecast to grow by around 4% by 2021 compared to 2012. Changes to rail or LU services as a result of construction activities have been assessed against 2026 baseline conditions.

¹⁵⁰ This includes Crossrail 1 but excludes Crossrail 2.

- 15.3.26 Euston underground station already experiences substantial crowding and congestion, with passenger demands on the escalators from interchange level to the platforms exceeding capacity, which at times requires management of station entry flows. This congestion will increase as demand at Euston underground station increases through to 2026, regardless of whether or not the revised scheme is built. In the absence of the revised scheme, works and additional management would be needed to address these issues.

Construction and operation (2026–2033)

- 15.3.27 Local future AM peak hour baseline traffic volumes in 2026 are forecast to remain at similar levels to 2021 with little growth between these years, largely as a function of forecast car ownership reductions and forecast increases in cycling demand. Future baseline public transport flows (in 2026) arriving at Euston by rail in the AM peak 07:00-10:00 period are forecast to increase by 52% as shown in Table 24 compared to 2012. In the PM peak 16:00-19:00 period, public transport flows (in 2026) leaving Euston by rail are forecast to increase by 58% compared to 2012.

Table 24: Baseline rail passenger demand at Euston station¹⁵¹

	AM peak period 07:00-10:00			PM peak period 16:00-19:00		
	2012 baseline	2026 baseline	2041 baseline	2012 baseline	2026 baseline	2041 baseline
From trains	24,680	37,510	44,020	11,530	15,710	20,150
To trains	8,510	13,910	17,410	23,980	37,970	44,920

- 15.3.28 Growth in public transport passenger numbers to 2026 and 2041 will result in a growth in taxi passenger demand. Table 25 shows the forecast demand for Euston station in 2026 and 2041 that will be dropped-off or picked-up by taxi at Euston station. The tables show the demand for both the AM and PM peak hours.

Table 25: Future baseline taxi passenger demand

	AM peak hour (08:00 to 09:00)		PM peak hour (17:00 to 18:00)	
	Pick-up from station	Drop-off at station	Pick-up from station	Drop-off at station
2026 Future Baseline	457	242	417	516
2041 Future Baseline	549	290	514	638

Operation (2041)¹⁵²

- 15.3.29 Local future baseline traffic volumes in the AM peak hour are forecast to grow by around 9% by 2041 compared to 2012. Future baseline public transport flows arriving at Euston by rail in the AM peak 07:00-10:00 period are forecast to increase by 78% compared to 2012. In the PM peak 16:00-19:00 period, public transport flows leaving Euston by rail are forecast to increase by 87% compared to 2012.

¹⁵¹ 2012 Baseline from <https://www.gov.uk/government/organisations/department-for-transport/series/rail-statistics>; 2026 and 2041 Baseline from TfL Railplan model.

¹⁵² The year of assessment, 2041, represents an assessment 15 years after the commencement of HS2 operation and also takes into account the likely growth in HS2 passengers following the opening of HS2 Phase 2.

15.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 15.4.1 The following measures (as detailed in Section 5) have been included as part of the engineering design of the revised scheme and will avoid or reduce effects on transport users:
- HGV routeing as far as possible along the strategic road network and using designated roads for access. These routes¹⁵³ are shown on SES2 and AP3 Map CT-05-001 (Volume 2, CFA1 Map Book);
 - site workers to use public transport to access the site with no on-site workers' parking;
 - the A400 Hampstead Road Bridge will require reconstruction. The bridge currently carries a six lane road over the existing conventional tracks. The existing bridge will be demolished and rebuilt as a six-lane bridge close to its current alignment. Reconstruction will involve removing one half of the width and replacing that, before repeating for the other half. Throughout reconstruction, one lane of traffic will be kept open in each direction. In addition, a cycle lane will be provided in each direction alongside the general traffic lanes. A footway will be maintained at all times during construction;
- 15.4.2 the proposed subsurface pedestrian route under Euston Square Gardens and A501 Euston Road and the connections to the Euston Square underground station platforms will be constructed using open cut excavation techniques and will include diversion of various utilities that will require the temporary closure of the eastbound and westbound bus lanes on A501 Euston Road. Construction will be phased across the road, in order to maintain two lanes in each direction, compared to the existing three lanes (including bus lanes) in each direction;
- 15.4.3 passenger access by car will be retained with temporary facilities for passenger drop-off in A4200 Eversholt Street, although no public car parking will be provided during construction phases or in the final completed station;
- the construction sequencing of the revised scheme retains taxi facilities in the basement for a short period before moving them to temporary facilities located in the west side of Euston Square Gardens. In 2023, the taxi facilities will be relocated to A4200 Eversholt Street, before moving to Cobourg Street at the end of construction Stage A in 2026. A set down for taxis will be retained in A4200 Eversholt Street. They will be moved to their permanent location in 2033, outside the A400 Hampstead Road station entrance north of the high speed station; and
 - cycle parking capacity will be maintained and specific temporary cycle parking locations proposed in consultation with TfL and LBC, as required. Any cycle hire docking stations affected by construction will be relocated.

¹⁵³ Note that the construction routes shown on this map are proposed to be used for access to utility worksites as well as construction compounds.

- 15.4.4 The draft CoCP seeks to reduce deliveries of construction materials and equipment, thus minimising construction lorry trip generation, especially during peak traffic periods. The draft CoCP will include HGV management and control measures.
- 15.4.5 The number of private car trips to and from the site (both workforce and visitors) will be minimised with no provision for workers' parking. This objective will be supported through an overarching framework travel plan¹⁵⁴ that will require travel plans to be used along with a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the revised scheme. As part of this, a construction workforce travel plan will be put into operation with the aim of encouraging the use of sustainable modes of transport.
- 15.4.6 The measures in the draft CoCP include clear controls on vehicle types, hours of site operation, and routes for HGVs to reduce the impact of road-based construction traffic. In order to achieve this, generic and site specific traffic management measures will be implemented on, or adjacent to, public roads and footpaths used by the public affected by the revised scheme, as necessary.
- 15.4.7 Specific management measures will include: the core site operating hours. As set out in the draft CoCP, these will be 08:00-18:00 on weekdays and 08-00-1300 on Saturdays, although certain specific construction activities will require extended working hours for reasons of engineering practicability (draft CoCP Section 5.2). Site staff and workers will generally arrive before the AM peak hour or depart after the PM peak hour.
- 15.4.8 Planned NR track possessions will be used to facilitate civil engineering works affecting the existing rail network. These possessions will be generally limited to weekends and mid-week nights to facilitate those construction activities planned outside the core working hours and to reduce disruption to rail passengers.
- 15.4.9 LU track possessions and short term platform closures will be used to facilitate civil engineering works affecting the existing LU network. These possessions will be generally limited to weekends and mid-week nights to facilitate those construction activities planned outside the core working hours and to reduce disruption to underground passengers.

Assessment of impacts and effects

Temporary effects

- 15.4.10 The following section considers the impacts on traffic and transport and the consequential effects resulting from construction of the revised scheme. It identifies, as appropriate, effects due to Euston construction activities in adjacent CFAs.
- 15.4.11 The main impacts of the revised scheme during the construction phase result from: additional construction traffic; changes to the highway network due to road closures, utility works and local diversions that will affect highway vehicles, buses, taxis, cyclists and pedestrians; changes to the layout of the station due to construction work that

¹⁵⁴ Construction and operational travel plans will promote the use of sustainable transport modes as appropriate to the location and types of trip. They will include measures such as: provision of information on and promotion of public transport services; provision of good cycle and pedestrian facilities; liaison with public transport operators; promotion of car sharing; and the appointment of a travel plan coordinator to ensure suitable measures are in place and are effective.

will affect passengers moving through the station; possessions and blockades on the NR network and LU platform closures and possessions.

- 15.4.12 More specifically the temporary traffic and transport impacts in the Euston area will be:
- construction vehicle movements to/from compounds as shown in Table 26;
 - long-term temporary road closures and associated diversions;
 - permanent road closures with replacement at Cobourg Street, A400 Hampstead Road and Granby Terrace Bridge;
 - removal of some parking and loading bays;
 - possessions and blockades on the NR network mainly during mid-week and at night; and
 - temporary LU platform closures (3 to 5 months in duration) on both branches of the Northern line and the Victoria line and a limited number of weekend closures of the Circle, Hammersmith & City and Metropolitan line running tunnel.
- 15.4.13 Details of construction compounds are provided in Section 5.3. The duration of when there will be busy transport activity at each site is shown in Table 26. This represents the period when the construction traffic flows will be greater than 50% of the peak flows. Also shown is the estimated number of daily vehicle trips during the peak month of activity and the lower end of the range shows the average number of trips in the busy period and the upper end the peak flows. The assessment has assumed the peak month for the combination of activities (i.e. not necessarily the peak activity at each individual site).
- 15.4.14 Construction vehicle movements required to construct the revised scheme will include the delivery of plant and materials and movement of excavated materials.
- 15.4.15 Construction compound use will vary in the two construction stages. For example, some construction compounds will only be in use during construction Stage A (2016 to 2026), some will change in size or layout for use in construction Stage B1 (2026 to 2033), a small number of new compounds will be present only for construction Stage B1 (2026 to 2033) and a few will be present throughout construction (from 2016 to 2033). Construction compound use is summarised in Section 5.3.

Table 26: Typical vehicle trip generation for construction site compounds in this area

Compound type	Location	Main Road Access	Indicative start set up date	Estimated duration of use	Estimated period with busy vehicle movements (months)	Average daily combined two-way vehicle trips during busy period and within peak month of activity	
						Cars/LGV	HGV
Satellite	Euston Square	A501 Euston Road	2016	18 years (2016-2033)	10 months	13 - 20	140-200

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Compound type	Location	Main Road Access	Indicative start set up date	Estimated duration of use	Estimated period with busy vehicle movements (months)	Average daily combined two-way vehicle trips during busy period and within peak month of activity	
						Cars/LGV	HGV
	Gardens (west) ³⁵⁵						
Main	National Temperance Hospital	A400 Hampstead Road	2016	18 years (2016-2033)	27 months	30 - 50	300 - 450
Satellite	Granby Terrace overbridge	A4201 Albany Street and A400 Hampstead Road via Robert Street/Stanhope Street and after end 2020 via Granby Terrace Bridge.	2016	11 years (2016-2026) and then will reduce in size for the construction Stage B1 period (2027 to 2033).	4 months	25-30	260-280
Satellite	Mornington Street overbridge	A400 Hampstead Road or A4201 Parkway via Mornington Terrace.	2016	5 years (2016-2020).	14 months	<10	20 - 30
	Mornington Terrace Sidings		2016	12 years (2016-2027)			
Satellite	A400 Hampstead Road overbridge (north)	A400 Hampstead Road.	2016	11 years (2016-2026).	15 months	<10	30-40
Satellite	A400 Hampstead Road overbridge (south)	A4200 Eversholt Street via Barnby Street or A200 Hampstead Road.	2016	18 years (2016-2033).	2 month	<10	16
Satellite	Royal Mail NW1 delivery office	A4200 Eversholt Street via Barnby Street.	2022	12 years (2022-2033).	5 months	<10	40

³⁵⁵ For the purpose of this table Euston Square Gardens (west) includes all movements to and from A501 Euston Road to the following compounds: Euston Square Gardens (west), the Podium main compound, Euston station, Euston station forecourt, Cobourg Street and Melton Street satellite compounds.

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Compound type	Location	Main Road Access	Indicative start set up date	Estimated duration of use	Estimated period with busy vehicle movements (months)	Average daily combined two-way vehicle trips during busy period and within peak month of activity	
						Cars/LGV	HGV
Satellite	Euston Square Gardens (east)	A4200 Eversholt Street.	2016	18 years (2016-2033).	13 months	<10	20-36
Satellite	Gordon Street	A501 Euston Road.	2017	2 years (2017-2018) & 6 years (2021-2026).	3 months	<10	20-30
Satellite	Lancing Street	A4200 Eversholt Street.	2018	7 years (2018-2024).	12 months	<10	<10
Satellite	Carriage Shed and Park Village East	A4201 Albany Street and A400 Hampstead Road via Robert Street/Stanhope Street and after end 2020 via Granby Terrace Bridge.	2016	11 years (2016-2026).	23 months	10 - 20	160 - 250
Satellite	Park Village East (North)	A4201 Parkway via north end of Park Village East.	2018	7 years (2018-2024).	14 months	<10 - 16	90 - 136

15.4.16 An off-site lorry holding area will be provided in part of the ZSL London Zoo coach park in Regent's Park, immediately north of Gloucester Gate Bridge. This area is identified within the land required on the Parliamentary Plans and, subject to agreement with the Crown Estate, will be used intermittently during periods of construction activity between 2016 and 2033.

15.4.17 The assessment of impacts and effects during construction Stage A are considered in the following order:

- rail and underground;
- highways;
- taxis;
- parking and loading;
- accidents and safety;
- buses;

- pedestrians; and
- cycling.

Rail and Underground

- 15.4.18 During construction Stage A, the planned works within the existing Euston station include the reconfiguration of the station platforms and this will affect the utilisation of platforms and LU access routes. Additional infrastructure, including ramp widening to platforms and an additional escalator from the concourse to the LU ticket hall, will be provided to support these revised routeings. Overall changes to travel distances within the station are less than 100m and these effects are not considered significant.
- 15.4.19 The revised scheme includes extensive improvements to Euston Square and Euston underground stations to accommodate additional passengers, which are completed by the end of 2026. These improvements will help address the existing congestion issues and allow the conventional and high speed stations to accommodate the forecast growth in passengers using Euston and Euston Square underground stations before and beyond 2026. The beneficial effects of these initial improvements and the operation of the revised scheme at Euston are considered in Section 15.5.
- 15.4.20 A number of interventions on the existing rail network are proposed to allow interface with the high speed railway to be established. Two main types of intervention are proposed. First, possessions to maintain safety while civil engineering works are taking place over, under or adjacent to the existing railway. Secondly, possessions to enable alterations to be made to the existing railway to accommodate the high speed railway.
- 15.4.21 Railway works will be planned with NR to ensure that disruption to passengers and freight is minimised as far as reasonably practicable. This includes measures such as:
- careful programming of works to coincide with possessions that are planned for the general maintenance of the existing railway;
 - planning works so that they will be undertaken in short, overnight stages when passenger services will not be disrupted; and
 - programming longer closures at weekends or bank holidays to minimise the number of passengers affected.
- 15.4.22 There will be a large number of individual interventions in the Euston area. These will be included in a number of standard possessions which vary in duration depending on the scale and complexity of the works planned. These range from mid-week night possessions, through to weekend possessions and bank holiday weekend possessions and longer blockades to carry out major track reconfiguration works. The great majority of the possessions will have little or no impact on the operation of Euston and its rail services as they are relatively minor localised works, such as work on and adjacent to tracks not in use overnight or at weekends when station use is less intense. In addition, many of the interventions will be combined to reduce the frequency of potential disruption. It is expected that there will be a number of possessions that will have the potential for substantial disruption to passengers, which includes some closures at weekends or times of reduced passenger traffic. While affecting users of the station, individually these are not considered significant.

Nonetheless, since the possessions will occur over the period of construction, their cumulative impact will have a moderate adverse significant effect. They will also have the potential to result in route-wide effects on the WCML and this is considered further in Volume 3, Route Wide.

- 15.4.23 The existing Line X will be reinstated as part of the revised scheme. Line X provides additional flexibility and resilience to the operation of the conventional station. However, during construction of the high speed approach, Line X will be temporarily closed for a three year period between 2018 and 2021. The temporary closure of Line X has the potential to adversely impact the resilience and flexibility of operation of the conventional station and WCML services during this period.
- 15.4.24 To mitigate any adverse impacts due to Line X closure during the works, train operating companies and NR will need to consider a range of mitigation measures. These will include, for example, consideration of declassification¹⁵⁶ of services and reduced turn-round times for services.
- 15.4.25 It is possible that it will be necessary to temporarily suspend some services to ensure resilience of the remaining services. While off peak and weekend services are likely to be affected, some alterations to peak services may be required and would be likely to be accompanied by other measures to minimise the impacts, which could include:
- lengthening of trains;
 - changes to stopping patterns; and
 - extension of services to other stations.
- 15.4.26 To illustrate the potential impacts, an assessment has been undertaken of withdrawing two AM peak Watford Junction to Euston services and one PM peak Euston to Watford Junction service.
- 15.4.27 This assessment indicates that passengers diverting from the withdrawn services would be likely to use the following lines as an alternative:
- over 50% would use Metropolitan and Jubilee line services from Finchley Road southbound;
 - under 10% would use the Northern line (Edgware branch) southbound;
 - 5% would use the Bakerloo line southbound; and
 - 4% would use the Northern line Mill Hill/High Barnet branch southbound.
- 15.4.28 Analysis indicates that the percentage change in journey time will be less than 10% and relatively few passengers would be affected. The effect is considered a minor adverse significant effect.
- 15.4.29 Construction of the improvements works to Euston underground station is likely to require some closures of the underground platforms although both the requirement for, and the duration of, any closures will be the subject of joint work with LU. The assessment is based upon the assumption that platform closures would involve:

¹⁵⁶ allowing rail passengers with standard class tickets to sit in first class carriages.

- the southbound Northern line (Bank branch) platform being closed during construction of the new escalator barrel and cross passage connections. Trains on this line will not stop at Euston for a three-month period from mid-May 2022 to mid August 2022;
- the Victoria line and the Northern line (Bank branch), northbound platforms, being closed simultaneously during construction of the new escalator barrel and construction of cross passage connections. Trains on these lines will not stop at Euston for approximately a five month period from early October 2022 to late February 2023; and
- the Northern line (Charing Cross branch), northbound and southbound platforms being closed simultaneously as part of construction Stage B1 of the station from January 2032 to early April 2032. The effects of this closure are reported under construction Stage B1 and operation (2026 to 2033).

Northern line (Bank branch) southbound platform closure

- 15.4.30 Passengers who would access conventional rail services at Euston or Euston underground station via the southbound Northern line (Bank branch) will need to access the station by other means. This will include some passengers changing to another line for either part, or all, of their journey or walking from adjacent underground stations. There is forecast to be an increase in passengers arriving at Euston underground station on the southbound Northern line (Charing Cross branch) in both the AM (+1,800 passengers) and PM (+1,360) peak periods and also in passengers walking to Euston from Euston Square underground station and Kings Cross St. Pancras.
- 15.4.31 The diversion of these passengers reduces crowding by around 0.5 passenger per metre squared (PPMS)¹⁵⁷ during the AM peak on the southbound Northern line (Bank branch) between Kings Cross and Angel but increases crowding by a similar amount on the Northern line (Charing Cross branch) between Camden Town and Tottenham Court Road.
- 15.4.32 With the Northern line (Bank branch) southbound platform closure, passengers travelling towards the City who would have interchanged at Euston will be likely to use the Charing Cross branch of the Northern line towards Kennington and then the Bank branch towards London Bridge or use the Metropolitan, Hammersmith & City or Circle lines to Moorgate before interchanging to the Northern line. Alternatively, passengers will use the Northern line and Victoria line and interchange at King's Cross St. Pancras or Warren Street. As well as passenger reductions on the southbound Northern line (Bank branch), there will be consequential reductions on the southbound Victoria line as the relatively easy interchange between the southbound Northern line (Bank branch) and Victoria line is removed.

Northbound Victoria line and Northern line (Bank branch) platforms closure

- 15.4.33 During the LU platform closures, passengers going to and from Euston underground station using the Victoria and Northern line (Bank branch) lines will need to access the

¹⁵⁷ Crowding defined by TfL as <1 PPMS – some standing, 1-2 PPMS – busy, 2-3 PPMS – crowded, 3-4 PPMS – very crowded and >4 PPMS – maximal.

station by other means. This will include some passengers changing to another line for either part, or all, of their journey or walking from adjacent underground stations. As a result there is forecast to be a substantial increase in passengers arriving at Euston on the northbound Northern line (Charing Cross branch) in both the AM (+3,600 passengers) and PM (+5,600) peak periods and also in passengers walking to Euston from Warren Street and Kings Cross St. Pancras. The increase in passengers using the Northern line (Charing Cross branch) results in small increases in crowding of 0.4 PPMS between Tottenham Court Road and Warren Street underground stations and larger increases of 1.3 PPMS between Warren Street and Euston underground stations, where crowding increases above 4 PPMS (this is generally defined as 'very crowded').

- 15.4.34 Passengers who would have interchanged at Euston will be likely to interchange between the Northern line and Victoria line at Warren Street or Kings Cross or instead use the Northern line (Charing Cross branch).
- 15.4.35 During construction Stage A, the two separate platform closures to the southbound Northern line (Bank Branch) and the northbound Victoria line platform and the Northern line (Bank branch) northbound platforms will each affect more than 20 tph and impact more than 10,000 passengers per day. For passengers needing to change route, the average percentage change in end-to-end journey times is less than 5% and this would not in itself be considered significant. However, based on the duration of platform closures, the loss of through connections, the impacts on crowding, the number of passengers who will be affected and the expected congestion that will result, this will represent a moderate adverse significant effect for both sets of platform closures.

Circle, Hammersmith & City and Metropolitan line closure

- 15.4.36 Construction of the new subway under A501 Euston Road requires the local removal of the crown of the Circle, Hammersmith & City and Metropolitan line running tunnel. In order to complete the works, a deck is required beneath the subway to protect LU assets from damage. This deck must be built within the tunnel of the LU trains. It is not possible to build this deck, complete the works, and then remove the deck again within an overnight closure and so weekend closures are required for these works. Minimising the number of weekend LU line closures requires A501 Euston Road to also be closed during each LU line closure to allow crane support for the works. It is anticipated that a limited number of weekend closures will be required with supporting overnight closures to complete the surrounding structural works. These closures would occur as part of construction Stage A between April 2024 and June 2025. As a result of the short duration of these closures, they would not result in any significant adverse effects on underground users.

Highways

- 15.4.37 Construction activities will result in a number of temporary, mainly partial, road closures with some roads rebuilt on altered alignments. The details of these closures and alignment changes are described in Section 5.4. In addition the construction of the new subway under A501 Euston Road requires it to be closed during the Circle, Hammersmith and City and Metropolitan line closure. It is anticipated that a limited number of weekend closures will be required with supporting overnight closures to

complete the works. The duration of these closures would not result in any adverse significant effects on highway users.

- 15.4.38 A number of vehicle access points to the construction sites will be required and so the construction vehicle movements will be spread over a number of roads. The majority of construction traffic is expected to access the main compound at the National Temperance Hospital, the Granby Terrace overbridge satellite compound and Carriage Shed and Park Village East satellite compounds. The National Temperance Hospital main compound will be accessed from A400 Hampstead Road. Initially vehicle access to the Granby Terrace overbridge and Carriage Shed and Park Village East satellite compounds will be from A400 Hampstead Road via Robert Street and Stanhope Street. On completion of Granby Terrace Bridge at the end of 2020 the bridge will reopen for construction traffic only enabling the majority of construction vehicles to access these compounds from A400 Hampstead Road via Granby Terrace. The bridge will then open to general traffic in mid-2023.
- 15.4.39 Drummond Street is identified as a construction route but will only be used for a small number of specific construction activities. This route is shown on Map CT-05-001 (SES2 and AP3, Volume 2, CFA1 Map Book). The volume of trips will be small and will not generate any significant traffic effects. In addition, a number of the routes identified on Map CT-05-001 (SES2 and AP3, Volume 2, CFA1 Map Book) are only used in support of utility works with only limited construction vehicle movements.
- 15.4.40 In the busiest month there are estimated to be approximately 800 combined two-way vehicle movements per day across the study area. The split of construction vehicles is expected to be 90% HGV and 10% LGV and cars.
- 15.4.41 It is envisaged that the A41 will be used to provide HGV access and egress routes for excavated material and contaminated waste to and from disposal sites north of London. Smaller numbers of HGV will enter and leave the site from the east (A13 - demolition arisings and concrete), the west (A40 - demolition arisings and concrete), the south (A4201 - concrete) and to and from A5200 York Way and A5203 York Way (concrete).
- 15.4.42 There is an interaction with CFA2 and CFA3 in terms of lorry routeing and impacts of road closures. Where these activities affect adjacent CFAs, these are identified in this assessment for completeness but the effects are reported in the relevant CFA.
- 15.4.43 Details of the indicative construction programme are provided in Section 5.4 (Figures 9a and 9b). In order to assess the different combinations of advance works, utility diversions and construction lorry movements through the construction period, the effects have been considered for four distinct temporal phases or scenarios, three of which occur during construction Stage A (2016-2026) and one during construction Stage B1 (2026–2033):
- Scenario 1, 2017. This corresponds with a combination of advance works and utilities on the highway network together with around 24% of the peak construction traffic;
 - Scenario 2, 2018. This corresponds with a different combination of advance works and utilities on the highway network together with around 49% of the peak construction traffic;

- Scenario 3, 2023. This corresponds with the main station works and is, overall, the busiest scenario assessed for construction traffic related to the removal of excavated material. It also includes the short-term highway works at B509 Adelaide Road (CFA3); and
- Scenario 4, 2031¹⁵⁸. This corresponds with the busiest period of construction traffic associated with construction Stage B1 (2026–2033).

15.4.44 The impacts of the short-term road highway works at B509 Adelaide Road (CFA3) have been modelled in combination with construction Scenario 3 to understand its effects.

15.4.45 Table 27 sets out the highway interventions by scenario with each highway intervention included in at least one scenario. In this way, the assessment includes the effects of all construction activities within at least one of the four scenarios.

Table 27: Construction highway interventions by construction scenario (2017 to 2031)

	Scenario 1 (2017)	Scenario 2 (2018)	Scenario 3 (2023)	Scenario 4 (2031)
Main works				
Gordon Street closed to general traffic	No	No	Yes	Yes
Euston station underground car park closed	No	Yes	Yes	Yes
Varndell Street closed to vehicles at A400 Hampstead Road	No	No	Yes	Yes
Eastern end of Starcross Street, Drummond Street, Euston Street and Stephenson Way closure at Cobourg Street	Yes	Yes	Yes	Yes
Cardington Street closed to general traffic	Yes	Yes	Yes	Yes
Melton Street closed to general traffic	Yes	Yes	Yes	Yes
A400 Hampstead Road Bridge/A400 Hampstead Road temporary substitution and reduction to two lanes	Yes	Yes	Yes	No
Granby Terrace Bridge closed to general traffic	No	Yes	Yes	No
Mornington Street Bridge closed	No	Yes	No	No
Park Village East closed	Yes	Yes	No	No
A501 Euston Road subway and Euston Square connection works	No	No	Yes	No
Utilities				
Diversion of various services via A4201 Albany Street and Robert Street	Yes	No	No	No

¹⁵⁸ Scenario 4, 2031, is described here and in Table 5 although the effects during this scenario are assessed in Section 15.5 construction Stage B1 and operation of HS2 Phase One (2026 & 2031).

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	Scenario 1 (2017)	Scenario 2 (2018)	Scenario 3 (2023)	Scenario 4 (2031)
Diversion of various services and closure of A5205 Prince Albert Road to general traffic	Yes	No	No	No
Diversion of various services via A4201 Parkway	No	Yes	No	No
Diversion of a sewer in A4200 Eversholt Street	No	Yes	No	No
Other				
Lorry holding area at ZSL London Zoo	No	Yes	Yes	Yes
Euston station taxi facility - relocated to Euston Square Gardens (west) and Endsleigh Gardens	No	Yes	No	No
Euston station taxi facility - relocated to A4200 Eversholt Street	No	No	Yes	No
Euston station taxi facility - relocated to Cobourg Street	No	No	No	Yes
CFA3, Primrose Hill intervention: B509 Adelaide Road ventilation shaft - closed section	No	No	Yes	No

15.4.46 In addition to the construction of the high speed station and directly rail related works, a series of other highway works will be required during construction of the revised scheme mostly associated with utility works. These include:

- provision of connections to two UK Power Networks substations in the Pentonville and Camden areas (a proposed substation in Calshot Street and St. Pancras substation), which will be undertaken in short sections along the proposed routes, with each section expected to take less than four weeks in duration. These routes are not, at any stage, expected to be fully closed to vehicular traffic;
- utility works in the A503 Delancey Street area to divert telecommunication cables;
- utility works required on North Gower Street, Gower Street, and Gower Place to allow 132kV electricity cables to be diverted across A501 Euston Road. It is not envisaged that these works will result in a road closure;
- possible utility works required on Endsleigh Gardens should any space constraints arise during the utility works on A501 Euston Road, which if needed would require sections of Endsleigh Gardens to be closed to facilitate the works;
- possible sewer replacement and lining works along Augustus Street; and
- further utility works with possible closures may be required on the following roads: Aldenham Street; Polygon Road; Lancing Street; Drummond Crescent and Doric Way.

- 15.4.47 Any partial or full road closures as a result of these works will be limited to a period of less than four weeks. The effect of these utility works will not result in significant effects and have not been considered further as part of the assessment of the highway network.
- 15.4.48 The utility works will include the replacement of gas mains on A4200 Eversholt Street. It is also possible that a Thames Water sewer, also on A4200 Eversholt Street, may be diverted along Phoenix Road and Chalton Street. However, should this sewer diversion be required, the works on Phoenix Road and Chalton Street are not expected to coincide with the works on A4200 Eversholt Street. The effect of these utility works will not be significant and has not been considered further as part of the assessment of the highway network.
- 15.4.49 Vehicles accessing worksites and the impact of temporary road closures and diversions during construction Stage A will result in changes in daily traffic flows on a number of roads. These will lead to a significant increase in delays¹⁵⁹ to vehicle occupants at a number of locations. Traffic and transport impacts and effects during Stage B1 construction and operation (2026 - 2033), including the effects of Scenario 4, are reported in the combined construction Stage B1 and operation section (Section 15.5).
- 15.4.50 The junctions with significant increases in delay, the construction scenario during which the effect occurs and the CFA in which the effect takes place are listed below:

CFA1

- A41 Gloucester Place/Crawford Street (minor adverse significant effect) – scenario 1 and 2;
- A400 Camden Street/Pratt Street (minor adverse significant effect) – scenario 1;
- A400 Hampstead Road/Drummond Street (minor adverse significant effect) – scenario 3;
- A4200 Russell Square/Bernard Street (minor adverse significant effect) – scenario 2;
- A501 Euston Road/Argyle Street (minor adverse significant effect) – scenario 3;
- A501 Euston Road/Ossulston Street (minor adverse significant effect) – scenario 2 and 3;
- A501 Marylebone Road/A4201 Park Crescent (minor adverse significant effect) – scenario 1;
- A501 Marylebone Road / Baker Street (minor adverse significant effect) - scenario 1, 2 and 3;

¹⁵⁹ In assessing significant effects of traffic changes on congestion and delays, a major adverse significant effect occurs where traffic flows at a junction will be beyond or very close to capacity with the revised scheme and the increases in traffic due to the revised scheme will be such as to substantially increase queues and delays on a routine basis at peak times. A moderate adverse significant effect will occur when traffic flows at a junction will be approaching or at capacity with the revised scheme and modest increases in traffic will increase the frequency of queues and more substantial delays. A minor adverse significant effect occurs when traffic flows at a junction are not generally exceeding capacity with the revised scheme but the increase in flows will result in occasional queues and delays or small increases in existing delays.

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- A5200 Grays Inn Road/A201 Swinton Street (minor adverse significant effect) – scenario 3;
- A5204 Goodge Street/Charlotte Street (minor adverse significant effect) – scenario 3;
- A5205 Prince Albert Road / A4201 Parkway (minor adverse significant effect) - scenario 3;
- B506 Great Portland Street/New Cavendish Street (minor adverse significant effect) – scenario 2;
- A4200 Eversholt Street/A400 Oakley Square (moderate adverse significant effect) – scenario 2 and 3;
- A501 Euston Road/Duke's Road (moderate adverse significant effect) – scenario 2 and 3;
- Phoenix Road/Chalton Street (moderate adverse significant effect) – scenario 1, 2 and 3;
- A400 Gower Street/Torrington Place (major adverse significant effect) – scenario 1, 2 and 3;
- A400 Tottenham Court Road/Warren Street (major adverse significant effect) – scenario 1, 2 and 3;
- A4200 Eversholt Street/A4200 Grafton Place (major adverse significant effect) – scenario 1, 2 and 3;
- A4200 Woburn Place/Tavistock Square (major adverse significant effect) – scenario 3;
- A4201 Parkway/A503 Delancey Street (major adverse significant effect) – scenario 1 and 2;
- A501 Euston Road (westbound)/A400 Hampstead Road (major adverse significant effect) – scenario 2 and 3;
- A501 Euston Road/A4200 Eversholt Street (major adverse significant effect) – scenario 1, 2 and 3;
- A501 Euston Road/Chalton Street (major adverse significant effect) – scenario 3;
- A501 Marylebone Road (eastbound)/Upper Montagu Street (major adverse significant effect) – scenario 1; and
- A501 Marylebone Road/Knox Street (major adverse significant effect) – scenario 3.

CFA3

- B517 Malden Road/Prince of Wales Road (moderate adverse significant effect) – scenario 3;

- Gloucester Avenue/Oval Road (major adverse significant effect) – scenario 3; and
- A502 Haverstock Hill/England's Lane (major adverse significant effect) – scenario 3.

15.4.51 Junctions that are significantly affected in CFA3 in Scenario 3 are as a result of the closure of B509 Adelaide Road in this scenario.

15.4.52 Where construction activity in Stage A is forecast to result in increases in daily traffic flow of more than 30% (for HGV or all vehicles) this will cause a significant increase in traffic-related severance¹⁶⁰ for non-motorised users resulting from these increased flows. The locations of these roads in CFA1 are shown in Table 28. The locations of roads outside CFA1 are shown in Table 29. These traffic flow increases do not result in a significant increase in congestion unless mentioned previously as one of the affected junctions. In many locations there are dedicated pedestrian crossing facilities that would mitigate any adverse effects but the assessment has not taken this into account.

Table 28: Significant increases in daily traffic flow resulting in traffic-related severance during construction Stage A

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A400 Gower Street - Bloomsbury Street (north of Torrington Place)	CFA1	moderate adverse	1 and 3	moderate adverse	1, 2 and 3
A400 Hampstead Road (south of A400 Oakley Square)	CFA1	moderate adverse	1	n/a	n/a
A400 Hampstead Road (north of A400 Oakley Square)	CFA1	moderate adverse	2	major adverse	2
A41 Baker Street (north of George St)	CFA1	minor adverse	1	moderate adverse	1
A41 Gloucester Place (north of Bickenhall Street)	CFA1	n/a	n/a	moderate adverse	1 and 2
A41 Park Road	CFA1	minor adverse	1	moderate adverse	1 and 2
A4200 Eversholt Street/ Euston Square	CFA1	major adverse	3	n/a	n/a
A4200 Russell Square	CFA1	moderate adverse	2 and 3	n/a	n/a

¹⁶⁰ In the context of this traffic and transport assessment, severance is used to relate to a change in ease of access for non-motorised users due to, for example, a change in travel distance or travel time or a change in traffic levels on a route that makes it harder for non-motorised users to cross. A reference to severance does not imply a route is closed to access.

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A4200 Southampton Row (north of Bloomsbury Way)	CFA1	n/a	n/a	moderate adverse	1
A4200 Upper Woburn Place - Tavistock Square	CFA1	moderate adverse	2 and 3	n/a	n/a
A4201 Albany Street	CFA1	moderate adverse	3	major adverse	2 and 3
A4201 Osnaburgh Street	CFA1	moderate adverse	3	n/a	n/a
A4201 Park Crescent	CFA1	n/a	n/a	moderate adverse	1 and 2
A4201 Parkway (west of Delancey Street)	CFA1	n/a	n/a	major adverse	2 and 3
A4201 Portland Place (north of Devonshire Street)	CFA1	n/a	n/a	major adverse	1 and 2
A501 Euston Road (Euston Circus slips)	CFA1	moderate adverse	2	moderate adverse	2
A404 Harrow Road (eastern slips of Edgware Road)	CFA1	moderate adverse	3	n/a	n/a
A5202 Pancras Road	CFA1	n/a	n/a	moderate adverse	3
A5202 Royal College Street (btw Plender St/ Pratt St)	CFA1&2	n/a	n/a	moderate adverse	2
A5202 St. Pancras Way (south of Pratt Street)	CFA1	n/a	n/a	moderate adverse	3
A5204 Goodge St/ Mortimer St	CFA1	minor adverse	3	n/a	n/a
Albert Street	CFA1&2	moderate adverse	1 and 2	moderate adverse	2
Arlington Road	CFA1&2	moderate adverse	2 and 3	moderate adverse	2
Augustus Street	CFA1	moderate adverse	3	n/a	n/a
B502 Brunswick Square/ Lansdowne Terrace/ B504 Grenville Street	CFA1	moderate adverse	2 and 3	n/a	n/a
B504 Judd Street	CFA1	moderate adverse	2 and 3	major adverse	2 and 3

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
Bickenhall Street	CFA1	n/a	n/a	minor adverse	1 and 2
Bidborough Street	CFA1	moderate adverse	2 and 3	moderate adverse	2 and 3
Burton Place	CFA1	moderate adverse	3	n/a	n/a
Cartwright Gardens	CFA1	minor adverse	3	moderate adverse	2, 3
Chalton Street	CFA1	moderate adverse	2 and 3	n/a	n/a
Charlbert Street	CFA1	n/a	n/a	moderate adverse	1, 2 and 3
Cleveland Street	CFA1	n/a	n/a	minor adverse	3
Colonnade	CFA1	moderate adverse	2 and 3	n/a	n/a
Conway Street	CFA1	minor adverse	2	n/a	n/a
Coram Street	CFA1	moderate adverse	3	moderate adverse	3
Cromer Street	CFA1	minor adverse	3	n/a	n/a
Cumberland Market	CFA1	minor adverse	2 and 3	n/a	n/a
Drummond Street (West of North Gower Street)	CFA1	moderate adverse	1, 2 and 3	n/a	n/a
Duke's Road	CFA1	moderate adverse	3	n/a	n/a
Fitzroy Street/ Charlotte Street	CFA1	moderate adverse	2 and 3	n/a	n/a
Endsleigh Gardens	CFA1	n/a	n/a	moderate adverse	1
Gower Place	CFA1	n/a	n/a	major adverse	1, 2 and 3
Grafton Way	CFA1	moderate adverse	2 and 3	moderate adverse	1, 2 and 3
Great Russell Street	CFA1	minor adverse	2	n/a	n/a
Harrington Square	CFA1	moderate adverse	1, 2 and 3	n/a	n/a
Herbrand Street	CFA1	moderate adverse	2 and 3	n/a	n/a
Longford Street	CFA1	moderate adverse	2 and 3	n/a	n/a

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
Mabledon Place	CFA1	moderate adverse	1, 2 and 3	moderate adverse	2 and 3
Manchester Street	CFA1	moderate adverse	1	n/a	n/a
Marchmont Street	CFA1	n/a	n/a	major adverse	3
Midland Road	CFA1	n/a	n/a	moderate adverse	3
Mornington Crescent	CFA1	moderate adverse	1, 2 and 3	moderate adverse	2 and 3
Mornington Place	CFA1	moderate adverse	1, 2 and 3	moderate adverse	2
Mornington Street	CFA1	moderate adverse	3	moderate adverse	2
North Gower Street	CFA1	moderate adverse	1, 2 and 3	n/a	n/a
Ossulston Street	CFA1	moderate adverse	1, 2 and 3	n/a	n/a
Park Crescent Mews West	CFA1	minor adverse	3	n/a	n/a
Park Village East	CFA1	moderate adverse	1 and 3	n/a	n/a
Phoenix Road	CFA1	moderate adverse	3	n/a	n/a
Plender Street	CFA1	n/a	n/a	major adverse	1 and 2
Polygon Road	CFA1	moderate adverse	2 and 3	n/a	n/a
Regent's Park Outer Circle	CFA1	major adverse	1 and 2	n/a	n/a
Robert Street	CFA1	major adverse	2 and 3	n/a	n/a
Russell Square	CFA1	n/a	n/a	moderate adverse	3
Stanhope Street	CFA1	major adverse	1, 2 and 3	n/a	n/a
Taviton Street	CFA1	moderate adverse	2 and 3	n/a	n/a
Torrington Place	CFA1	moderate adverse	1, 2 and 3	n/a	n/a
University Street	CFA1	n/a	n/a	moderate adverse	2
Varndell Street	CFA1	major adverse	2	major adverse	2

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
Warren Street	CFA1	minor adverse	2	n/a	n/a

Table 29: Significant increases in daily traffic flow resulting in traffic-related severance (outside CFA1) during construction Stage A

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A503 Delancey Street	CFA2	moderate adverse	3	major adverse	2
A5202 Royal College Street	CFA2	n/a	n/a	moderate adverse	2
Albert Street	CFA2	moderate adverse	1 and 2	n/a	n/a
Arlington Road	CFA2	moderate adverse	2	n/a	n/a
Castle Road	CFA2	minor adverse	1, 2	n/a	n/a
Great Percy Street	CFA2	minor adverse	3	n/a	n/a
Greenland Road	CFA2	moderate adverse	1 and 2	n/a	n/a
Jamestown Road	CFA2	moderate adverse	1, 2 and 3	moderate adverse	1
Oval Road	CFA2	moderate adverse	1, 2 and 3	moderate adverse	1
Pratt Street	CFA2	minor adverse	1 and 2	moderate adverse	3
Westbourne Road	CFA2	minor adverse	1 and 2	n/a	n/a
A41 Finchley Road	CFA3	n/a	n/a	major adverse	2
A502 Chalk Farm Road	CFA3	n/a	n/a	moderate adverse	1 and 2
A502 Haverstock Hill	CFA3	moderate adverse	3	n/a	n/a

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
Albert Terrace	CFA3	n/a	n/a	moderate adverse	1 and 2
Alexandra Road	CFA3	minor adverse	3	n/a	n/a
B509 Adelaide Road (East of Primrose Hill Road)	CFA3	n/a	n/a	major adverse	1 and 2
B510 Fortune Green Road	CFA3	minor adverse	3	n/a	n/a
B517 Ferdinand Street	CFA3	moderate adverse	3	n/a	n/a
B525 Avenue Road	CFA3	moderate adverse	1 and 2	n/a	n/a
Carlton Hill	CFA3	n/a	n/a	major adverse	3
Crogsland Road	CFA3	major adverse	3	n/a	n/a
Elsworthy Road	CFA3	minor adverse	2	n/a	n/a
Fairfax Road	CFA3	n/a	n/a	major adverse	3
Gloucester Avenue	CFA3	moderate adverse	1	major adverse	1 and 2
Loudoun Road	CFA3	n/a	n/a	major adverse	3
Parkhill Road	CFA3	moderate adverse	3	n/a	n/a
Platt's Lane	CFA3	moderate adverse	3	n/a	n/a
Primrose Hill Road	CFA3	moderate adverse	3	n/a	n/a
Prince of Wales Road	CFA3	moderate adverse	3	n/a	n/a
Princess Road	CFA3	n/a	n/a	moderate adverse	1
Regent's Park Road	CFA3	major adverse	3	major adverse	1 and 2

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Increase in daily traffic flow more than 30% for all vehicles		Increase in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
Lanark Road	CFA4	moderate adverse	3	n/a	n/a
Randolph Avenue	CFA4	minor adverse	1 and 2	n/a	n/a

15.4.53 Where construction activity in Stage A is forecast to result in decreases in daily traffic flow of more than 30% (for HGV or all vehicles) this will cause a significant reduction in traffic-related severance resulting from these reduced flows. The locations of these roads in CFA1 are shown in Table 30. The locations of these roads outside CFA1 are shown in Table 31.

Table 30: Significant decreases in daily traffic flow resulting in reduced traffic-related severance (CFA1) during construction Stage A

Location	CFA	Decrease in daily traffic flow more than 30% for all vehicles		Decrease in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A400 Camden Street	CFA1	n/a	n/a	major beneficial	3
A400 Hampstead Road (south of A400 Oakley Square)	CFA1	n/a	n/a	major beneficial	2 and 3
A400 Harrington Square/ Lidlington Place	CFA1	n/a	n/a	moderate beneficial	3
A41 Wellington Road	CFA1&3	n/a	n/a	moderate beneficial	3
A4200 Eversholt Street/ Euston Square	CFA1	n/a	n/a	major beneficial	3
A4200 Upper Woburn Place - Tavistock Square	CFA1	n/a	n/a	major beneficial	2 and 3
A4201 Albany Street	CFA1	moderate beneficial	1	moderate beneficial	1
A4201 Osnaburgh Street	CFA1	n/a	n/a	moderate beneficial	1 and 2
A4201 Parkway	CFA1	minor beneficial	1 and 2	moderate beneficial	1
A5 Edgware Road/ Maida Vale	CFA1&4	n/a	n/a	moderate beneficial	1 and 3
A501 Euston Road (Euston Circus slips)	CFA1	n/a	n/a	major beneficial	1 and 3
A404 Harrow Road (Edgware Road)	CFA1	n/a	n/a	moderate beneficial	1, 2 and 3

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Decrease in daily traffic flow more than 30% for all vehicles		Decrease in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A5205 Prince Albert Road	CFA1	moderate beneficial	1 and 2	moderate beneficial	1 and 2
A5205 St. John's Wood Road	CFA1	n/a	n/a	major beneficial	1 and 3
Arlington Road	CFA1&2	moderate beneficial	1, 2 and 3	n/a	n/a
Augustus Street	CFA1	moderate beneficial	1 and 2	n/a	n/a
B502 Brunswick Square/ Lansdowne Terrace/ B504 Grenville Street	CFA1	minor beneficial	1	n/a	n/a
B506 Great Portland Street	CFA1	n/a	n/a	major beneficial	1 and 2
B507 Lisson Grove	CFA1	n/a	n/a	moderate beneficial	1 and 2
B525 Avenue Road	CFA1	n/a	n/a	minor beneficial	1
Cavendish Avenue	CFA1	minor beneficial	1	n/a	n/a
Charlbert Street	CFA1	minor beneficial	1 and 2	n/a	n/a
Charlotte Street	CFA1	n/a	n/a	minor beneficial	3
Cleveland Street	CFA1	minor beneficial	3	n/a	n/a
Cobourg Street	CFA1	moderate beneficial	1, 2 and 3	n/a	n/a
Colonnade	CFA1	minor beneficial	1	n/a	n/a
Cumberland Market	CFA1	minor beneficial	1	n/a	n/a
Drummond Street (East of North Gower Street)	CFA1	moderate beneficial	1, 2 and 3	moderate beneficial	1, 2 and 3
Endsleigh Street	CFA1	minor beneficial	2 and 3	moderate beneficial	1, 2 and 3
Euston Street	CFA1	moderate beneficial	1, 2 and 3	n/a	n/a
Fitzroy Street/ Charlotte Street	CFA1	moderate beneficial	3	moderate beneficial	3
Gordon Street/Gordon Square	CFA1	moderate beneficial	1, 2 and 3	major beneficial	1, 2 and 3
Endsleigh Gardens	CFA1	moderate beneficial	2, 3	moderate beneficial	1, 2 and 3

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Decrease in daily traffic flow more than 30% for all vehicles		Decrease in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
Granby Terrace	CFA1	moderate beneficial	1, 2 and 3	moderate beneficial	3
Longford Street	CFA1	minor beneficial	1	moderate beneficial	1 and 2
Montague Street	CFA1	n/a	n/a	moderate beneficial	3
Mornington Street	CFA1	moderate beneficial	1	minor beneficial	1
Mornington Terrace	CFA1	moderate beneficial	2 and 3	moderate beneficial	2
North Gower Street	CFA1	n/a	n/a	moderate beneficial	1, 2 and 3
Oakley Square	CFA1	n/a	n/a	moderate beneficial	3
Ossulston Street	CFA1	n/a	n/a	minor beneficial	3
Park Village East	CFA1	moderate beneficial	2	moderate beneficial	1 and 2
Phoenix Road	CFA1	n/a	n/a	minor beneficial	3
Plender Street	CFA1	minor beneficial	1	n/a	n/a
Polygon Road	CFA1	minor beneficial	3	n/a	n/a
Robert Street	CFA1	moderate beneficial	1	major beneficial	2 and 3
Rossmore Road	CFA1	n/a	n/a	moderate beneficial	1 and 2
Russell Square	CFA1	n/a	n/a	moderate beneficial	1
St. John's Wood Terrace	CFA1	minor beneficial	1	n/a	n/a
Stanhope Street	CFA1	n/a	n/a	moderate beneficial	1, 2 and 3
Varndell Street	CFA1	moderate beneficial	1 and 3	n/a	n/a

Table 31: Significant decreases in daily traffic flow resulting in reduced traffic-related severance (outside CFA1) during construction Stage A

Location	CFA	Decrease in daily traffic flow more than 30% for all vehicles		Decrease in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A502 Chalk Farm Road	CFA2 and 3	moderate beneficial	3	moderate beneficial	3

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Location	CFA	Decrease in daily traffic flow more than 30% for all vehicles		Decrease in daily traffic flow more than 30% for HGV	
		Significant effect	Construction Scenario	Significant effect	Construction Scenario
A503 Camden Road	CFA2	n/a	n/a	moderate beneficial	2
Albert Street	CFA1 and 2	n/a	n/a	minor beneficial	3
Castlehaven Road	CFA2	minor beneficial	3	minor beneficial	3
A41 Finchley Road	CFA3	n/a	n/a	moderate beneficial	3
A41 Wellington Road	CFA1 and 3	n/a	n/a	moderate beneficial	3
Abercorn Place	CFA3	n/a	n/a	moderate beneficial	1 and 2
B509 Adelaide Road (West of Primrose Hill Road)	CFA3	n/a	n/a	moderate beneficial	1, 2 and 3
B509 Adelaide Road (East of Primrose Hill Road)	CFA3	moderate beneficial	3	moderate beneficial	3
B517 Ferdinand Street	CFA3	minor beneficial	1 and 2	n/a	n/a
B525 Avenue Road	CFA1 and 3	moderate beneficial	3	moderate beneficial	1
Grove End Road	CFA3	n/a	n/a	minor beneficial	1 and 2
Primrose Hill Road	CFA3	n/a	n/a	moderate beneficial	1 and 2
Princess Road	CFA3	n/a	n/a	major beneficial	2
Regent's Park Road	CFA3	minor beneficial	1 and 2	n/a	n/a
A5 Edgware Road	CFA1 and 4	n/a	n/a	moderate beneficial	1 and 3

Taxis

- 15.4.54 Two changes to the location of the taxi rank are planned during construction Stage A, initially relocating it from its existing basement location to sites in Euston Square Gardens and then to A4200 Eversholt Street. The increase in travel distance to Euston Square Gardens will increase by over 100m and will result in a minor adverse significant effect. The distance to walk to the temporary taxi facility on A4200 Eversholt Street from the station will increase by over 200m. This will result in a moderate adverse significant effect.

Parking and loading

- 15.4.55 Construction Stage A will have a range of impacts on parking, which is assessed by considering the loss of parking spaces, offset by the availability and number of spaces in the local area. In summary, the significant effects are:
- Robert Street (moderate adverse significant effect) – a temporary loss of 21 pay and display bays and one residential permit holder bay on the north side of the road. In addition five pay and display bays will be converted on the south side of the road to offset the loss of residential permit holder bays on Stanhope Street;
 - Stanhope Street (moderate adverse significant effect) – a temporary loss of 20 residential permit holder bays and four pay and display bays. Five pay and display bays on the south side of Robert Street will be converted into residential permit holder bays to offset part of the loss;
 - Mackworth Street (moderate adverse significant effect) – a temporary loss of 16 residential permit holder bays;
 - Varndell Street (moderate adverse significant effect) – a temporary loss of 10 residential permit holder bays;
 - Harrington Street (moderate adverse significant effect) a temporary loss of ten residential permit holder bays (three of which will be a permanent loss) and two pay and display bays;
 - Park Village East (major adverse significant effect) – a temporary loss of 38 residential permit holder bays and 12 pay and display bays;
 - Mornington Terrace (major adverse significant effect) – a temporary loss of 31 residential permit holder bays and five motorcycle bays;
 - A400 Hampstead Road (major adverse significant effect) – a temporary loss of seven pay and display, six taxi bays and two loading bays;
 - Starcross Street (moderate adverse significant effect) – a temporary loss of 10 residential permit holder bays; and
 - Lancing Street (moderate adverse significant effect) – a temporary loss of three pay and display bays and one loading bay with one blue badge holder bay replaced/relocated as mitigation.
- 15.4.56 Loading is permitted within the southbound bus lane on A4200 Eversholt Street outside of bus lane operation (the bus lane operates between 0700-1000 and 1600-1900). The bus lane will be suspended due to utility works and may also be suspended to facilitate provision of temporary taxi facilities between 2023 and 2026. In addition to this, two loading bays will be suspended on the west side of A4200 Eversholt Street. This will have a major adverse significant effect.
- 15.4.57 A total of approximately 25 parking bays will be suspended on Drummond Crescent to provide a secondary taxi rank during construction. Included in this total are residential permit holder bays (eight), pay and display bays (two) and motorcycle bays (15). This will have a moderate adverse significant effect.

- 15.4.58 A section of Park Village East will be temporarily closed to traffic preventing vehicular access to off-street parking at a number of properties resulting in the loss of approximately 31 off-street parking spaces. This will have a major adverse significant effect.
- 15.4.59 Due to the construction of a temporary utilities bridge connecting A400 Hampstead Road to the Amphill Estate, approximately 64 private parking spaces within the Amphill Estate will be temporarily suspended. This will have a major adverse significant effect.
- 15.4.60 In addition, a number of permanent parking closures, due to the revised scheme, will be in place by the end of construction Stage A (2026) at the following locations: Granby Terrace Bridge; Drummond Street; Cobourg Street; Gordon Street; Cardington Street and Melton Street. The effects of these permanent closures are reported in Section 15.5.

Accidents and safety

- 15.4.61 The impact on accident and safety risk has been reviewed. Increases in flows on major roads and through certain junctions could bring a commensurate increase in accident risk. There will be other roads with reductions in traffic flows with potentially beneficial effects. During construction, there will be a minor adverse significant effect on accident risk at Regent's Park, Outer Circle as a result of expected changes in traffic flows.

Buses

- 15.4.62 During construction Stage A, works will require the temporary closure of bus lanes and the relocation of some existing bus stops/facilities, including temporary removal of the southbound bus lane on A4200 Eversholt Street; removal of the northbound and southbound bus lanes on A400 Hampstead Road Bridge and removal of the eastbound and westbound bus lanes on A501 Euston Road.
- 15.4.63 During construction Stage A, eight additional bus stands will be constructed on the Royal Mail delivery office site, to the north of the conventional station with access provided off A4200 Eversholt Street.
- 15.4.64 The removal of bus lanes on A4200 Eversholt Street is not predicted to increase bus journey times by more than 10% and the effects on this road will not be significant.
- 15.4.65 The closure of bus lanes on A501 Euston Road and A400 Hampstead Road, as well as some additional bus delay on each route, result in the following significant effects:
- route 10 (eastbound) – moderate adverse significant effect in the AM and PM peak hour;
 - route 24 (northbound) – moderate adverse significant effect in the AM and PM peak hour;
 - route 29 (northbound) – moderate adverse significant effect in the AM and PM peak hour;
 - route 73 (northbound) – moderate adverse significant effect in the AM and PM peak hour;

- route 134 (northbound) – moderate adverse significant effect in the AM and PM peak hour;
- route 390 (northbound) – moderate adverse significant effect in the AM and PM peak hour;
- route 14 (northbound) – moderate adverse significant effect in the AM and PM peak hour; and
- route C19 (westbound) – minor adverse significant effect in the AM peak and moderate adverse effect in the PM peak.

15.4.66 The relocation of bus stops and bus facilities is not generally expected to have a significant effect as alternative facilities will be available to passengers within 100m for most roads. The exception is a moderate adverse significant effect on two bus stops on the A400 Hampstead Road Bridge near Silverdale, Regent's Park Estate (bus stop B and bus stop W), which may have to be relocated by more than 200 metres or temporarily suspended.

Pedestrians

15.4.67 Permanent and long period temporary road closures as described in Section 5, will lead to increases in journey distance for pedestrians and consequential severance. Passengers walking from the conventional station to streets to the west of the station may at times experience increased walking distances of over 100 metres because of the presence of construction compounds and hoardings.

15.4.68 There will be significant effects for users at the following locations:

- Granby Terrace Bridge (major adverse significant effect);
- Varndell Street (minor adverse significant effect);
- Cardington Street (minor adverse significant effect);
- Melton Street (minor adverse significant effect);
- Drummond Street (minor adverse significant effect);
- Cobourg Street (minor adverse significant effect);
- Euston Street (minor adverse significant effect);
- Starcross Street (minor adverse significant effect); and
- Stephenson Way (minor adverse significant effect).

Cycling

15.4.69 Any disruption to cycle routes through and around the station will not have a significant effect on the majority of routes, due to the small changes in journey times. Temporary cycle routes will be developed in consultation with TfL and LBC. Routes where there will be significant effects are:

- closure of Melton Street and Cardington Street will increase the journey time of some cyclists by about two minutes (based on a 400m diversion via A400

Tottenham Court Road and A400 Hampstead Road) and the partial loss of LCN unofficial route 6a, which results in a moderate adverse significant effect; and

- closure of Granby Terrace will increase the journey times of some cyclists by two to three minutes resulting in a minor adverse significant effect.

- 15.4.70 The closure of Prince Albert Road for utility works will require cyclists to dismount and use the footpath to pass the worksite, but alternative routes are also available for cyclists via the Regent's Park Outer Circle and Gloucester Avenue. The effect on cyclists is therefore not significant.
- 15.4.71 During the works that affect Park Village East a footway will be maintained alongside the worksite. Cyclists may be required to dismount to pass the worksite, but alternative routes are also available for cyclists via A4201 Albany Street or Mornington Terrace. The effect on cyclists is therefore not significant.
- 15.4.72 It is expected that cycle hire docking stations will be relocated at Drummond Street, A501 Euston Road, A400 Hampstead Road near Cartmel and A400 Hampstead Road near A400 Harrington Square. Cycle parking locations affected by construction activities will be relocated and the existing total number of cycle parking spaces will be maintained during the construction phase.
- 15.4.73 There will be no significant effect on cycle parking at Euston station.

Cumulative effects

- 15.4.74 The assessment includes the cumulative effects of planned development in the area during construction by taking this into account within the background traffic growth.
- 15.4.75 The assessment also includes in-combination effects by taking into account traffic and transport impacts of works being undertaken in neighbouring CFA areas. Construction traffic flows of 50 HGV per day, as generated by the B509 Adelaide Road ventilation shaft main compound in CFA3, have been included in the assessment.

Permanent effects

- 15.4.76 Any permanent effects of construction have been considered in the operations phase assessments for traffic and transport in Section 15.5. This is because the impacts and effects of the forecast increases in travel demand and the wider impacts and effects of the operations phase need to be considered together.

Other mitigation measures

- 15.4.77 The implementation of the draft CoCP in combination with the construction workforce travel plans will mitigate the transport related effects during construction of the revised scheme. The reductions in effects arising from the travel plan measures have not been included in the assessment.
- 15.4.78 Rail replacement bus services will also be provided as necessary when rail possessions are in place.
- 15.4.79 The northbound Victoria and Northern line (Bank branch) and southbound Northern line (Bank branch) platform closures together with any weekend closure of the Circle, Hammersmith and City and Metropolitan line will result in disruption to passengers during these periods. In order to minimise disruption, the closures will be

programmed so that they do not overlap. Mitigation would include advance warning of platform closures through the media and TfL's journey planner, together with announcements on affected lines and signage at stations along these lines informing passengers of available alternatives. Bus services could be modified in the Euston and Warren Street area to assist passengers connecting between the underground stations and wider changes could be appropriate to provide alternative routes to and from Euston underground station.

- 15.4.80 Most signalised highway junctions in central London are under adaptive control which will optimise the signal stages in real time. Therefore, many of those junctions with an identified minor effect will be mitigated through adaptive control, although this is less effective where there is a substantial overall net increase in traffic through the junction.
- 15.4.81 Additional delays to bus routes have been identified as a result of construction activities resulting in significant effects on eight bus routes. The additional delay takes place on Tottenham Court Road in particular at its junction with Euston Circus and Warren Street. With changes to the signal times at these two junctions through adaptive control the additional delay can be removed which means these effects will not be significant.
- 15.4.82 No further traffic and transport mitigation measures during construction of the revised scheme are considered necessary.
- 15.4.83 Investigation will continue to establish whether movement of some excavated material by rail is feasible.

Summary of likely residual significant effects (2017 - 2026)

- 15.4.84 Construction activities associated with the works at Euston will lead to public transport delays due to the need for interventions on the existing rail network (route-wide) and potentially cancellation of some services.
- 15.4.85 Changes in traffic flows will result from construction traffic, local road closures and relocation of taxi operations. This will cause increased difficulty for pedestrians crossing the road. Increases in traffic flows will mainly be concentrated on some roads to the east of Euston in the Somers Town and King's Cross area, particularly around the A4200 Eversholt Street; on the A501 Euston Road between Gordon Street and King's Cross; to the south in the Bloomsbury area resulting from the closure of Gordon Street particularly A400 Gower Street and B504 Judd Street; in the Regent's Park and Camden Town areas on roads around A4201 Parkway and on the A41 and other construction lorry routes.
- 15.4.86 Reductions in traffic flow due to traffic diversions are expected and will result in improvements for pedestrians crossing the road. The impacts will mainly be concentrated on roads to the south of Gordon Street in the Bloomsbury area, in particular, on Gordon Street, Gordon Square, Woburn Place and Southampton Row; to the immediate west of the conventional station as a result of the closure of Cardington Street and in the Regent's Park Estate to the north west of the conventional station.
- 15.4.87 Effects on heavily used parking and loading facilities arising from construction of the revised scheme in Stage A are identified at the following locations: Robert Street;

Stanhope Street; Mackworth Street; Varndell Street; Harrington Street; Park Village East; Mornington Terrace; A400 Hampstead Road; Starcross Street; Lancing Street; A4200 Eversholt Street; Drummond Crescent and the Amphill Estate.

- 15.4.88 Eight bus routes will be affected, bus route 10 (eastbound), bus route 24 (northbound) bus route 29 (northbound), bus route 73 (northbound), bus route 134 (northbound), bus route 390 (northbound), bus route 14 (northbound) and bus route C19 (westbound). However, these effects can be mitigated by adaptive signal control. Works will also require the relocation or removal of the bus stops on A400 Hampstead Road.
- 15.4.89 Works at Euston underground station will require the temporary closure (3 to 5 months in duration) of the southbound Northern line (Bank branch) platform and the Victoria line and Northern line (Bank branch) northbound platforms. The construction of the new subway under A501 Euston Road will require a limited number of weekend closures of the Circle, Hammersmith & City and Metropolitan line running tunnel but does not result in any significant effects.
- 15.4.90 Construction activities will result in disruption to passengers at Euston station as a result of relocation of the station taxi facilities and the need to divert passenger routes at the station.
- 15.4.91 The most intensive peak periods of construction will have a significant effect on pedestrians and cyclists at Melton Street, Cardington Street and Granby Terrace Bridge.
- 15.4.92 A potential increase in accident and safety risks has been identified at Regent's Park, Outer Circle.
- 15.4.93 Severance to users of non-motorised modes will be experienced at the following locations: Granby Terrace Bridge; Varndell Street; Cardington Street; Melton Street; Drummond Street; Euston Street; Cobourg Street; Starcross Street and Stephenson Way.
- 15.4.94 The significant effects that result from construction of the revised scheme are shown on Map Series TR-03-001 (SES2 and AP3 Volume 5, Traffic and transport, CFA1 Map Book).

15.5 Effects arising during construction Stage B1 (2026–2033) and operation (2026)

- 15.5.1 The assessment of impacts and effects of construction Stage B1 and operation is based on ongoing construction activities following opening of the first six high speed platforms at the end of 2026 (i.e. at the end of construction Stage A) with Phase One HS2 services in operation.
- 15.5.2 During construction Stage B1 (2026 to 2033), a further five high speed platforms and the remainder of the eastern side of the high speed station will be completed. There will be only limited construction activity north of A400 Hampstead Road during construction Stage B1.

- 15.5.3 This section presents the likely environmental effects of construction Stage B1 and operation of HS2 Phase One services between the end of 2026 and the end of 2033. The effects of HS2 Phase Two services in 2041 are considered in Section 15.6.
- 15.5.4 The Stage A station comprises the operational features completed by the end of construction Stage A, including:
- the completed western half of the high speed station with station accommodation located temporarily in buildings fronting Cobourg Street and the western part of the service and logistics basement accessed from ground level via lifts from a temporary servicing and logistics centre (accessed from A400 Hampstead Road). Entrances to the high speed station will be provided at this time from the south from A501 Euston Road and west from Cobourg Street;
 - new LU infrastructure including a new pedestrian subway between the high speed station, Euston Square underground station and under A501 Euston Road to a new entrance in Gordon Street;
 - additional bus stands off A4200 Eversholt Street; and
 - new taxi drop-off arrangements to the east of the conventional station on A4200 Eversholt Street and taxi drop off and pick up west of the high speed station on Cobourg Street.
- 15.5.5 In addition to the Stage A station, by the end of 2026, construction of the revised scheme will have resulted in changes to the layout of streets, including some permanent road closures to the south, west and north of the high speed station.
- 15.5.6 In this section, where the assessment refers to Euston station, and no distinction is made between conventional and high speed stations, this is a collective term for the two stations.

Avoidance and mitigation measures

- 15.5.7 The following measures have been included as part of the design of the Stage A station and will avoid or reduce impacts on transport users:
- in late 2026 with the completion of construction Stage A, HS2 Phase One services will operate on six high speed platforms. At this time, the conventional station will operate from a minimum of 11 platforms and will accommodate a different mix of short distance and long distance services. There will be a transfer of long distance passengers to HS2 and this represents a major change in how the rail services operate out of Euston, with changes to conventional service patterns and pedestrians and vehicles relocating to new routes;
 - at the end of construction Stage A, the new western entrance to the station at the northern end of Cobourg Street will provide cycle parking, links to bus services on A400 Hampstead Road and local community access to the station;
 - additional LU station infrastructure is also provided from the end of construction Stage A and would be operational during construction Stage B1

including:

- a new entrance to Euston underground station next to the Podium building (external to the conventional concourse) increasing station capacity and allowing independent operation of LU;
- new escalators and lifts serving the Victoria line and the Northern line (Bank branch) to improve station capacity and provide step-free access; and
- a new pedestrian subway between the high speed station, Euston underground station, Euston Square underground station and under A501 Euston Road to a new entrance in Gordon Street. This allows for improved interchange and general access to the Hammersmith & City, Circle and Metropolitan lines, step-free access to Euston Square underground station and improved pedestrian access across A501 Euston Road; and
- additional cycle parking spaces are provided as part of Stage A station at the northern end of Cobourg Street near the western high speed station entrance;
- bus services will continue to operate from the current bus station alignment to the south of the station but in addition will have use of a new bus standing area off A4200 Eversholt Street to the north of the conventional station, providing eight bus stands;
- at the end of construction Stage A, taxis will have facilities to drop-off passengers on A4200 Eversholt Street and at the northern end of Cobourg Street with pick-up at the southern end of Cobourg Street. Managed taxi share will operate, which will help to reduce empty taxi travel;
- pick-up and drop-off facilities for private cars and mobility impaired passengers are provided at the northern end of Cobourg Street; and
- part of the new high speed station servicing and logistic basement will be operational at the end of construction Stage A with access for service vehicles from A400 Hampstead Road (the permanent ramp from the A400 Hampstead Road Bridge is not completed until the end of construction Stage B1).

15.5.8 In order to promote sustainable travel, the revised scheme does not provide public car parking at the high speed or conventional station.

15.5.9 During construction Stage B1, the main construction compound at the National Temperance Hospital will still be in use. However, the southern part of the compound area will be reduced in size to allow opening of a western high speed station entrance off Cobourg Street and a new compound area created on the deck to the north of the high speed station.

Assessment of impacts and effects (2026–2033)

15.5.10 The following section considers the impacts on traffic and transport and the consequential effects resulting from construction Stage B1 and operation of HS2 Phase One between 2026 and 2033 (referred to as construction Stage B1 and operation).

- 15.5.11 In order to assess the impacts and effects through the period of construction Stage B1 and operation, the effects have been considered for two distinct temporal phases:
- 2026: this corresponds to the opening – in late 2026 – of the western side of the high speed station including six high speed platforms with – for the purposes of assessment – no construction activity. This represents Hs2 Phase One operation with infrastructure completed by the end of construction Stage A; and
 - 2031: this is Scenario 4 summarised in Table 27 and corresponds to the busiest period for construction traffic during construction Stage B1, which will generate around 50% of the construction traffic in Scenario 3.
- 15.5.12 The main impacts of completion of Stage A and operation of HS2 Phase One can be summarised as:
- increases to rail passengers arriving and departing Euston station with consequential increases in onward travel by LU, bus, cycle, walking and taxi associated with the commencement of Hs2 Phase One services at the end of 2026;
 - the permanent removal or reduction of parking and loading bays on Varndell Street, Harrington Street, Granby Terrace Bridge, Mornington Crescent, Drummond Street, Starcross Street, Cobourg Street, Barnby Street, Gordon Street, Euston Street, Cardington Street and Melton Street;
 - the replacement of two of four footpaths which will be re-provided as part of the public realm, public open space or on slightly different alignments; and
 - permanent road closures and associated diversions around the conventional and high speed stations including closures to vehicles to all or parts of Cardington Street; Melton Street; Stephenson Way; Drummond Street; Euston Street; Varndell Street at A400 Hampstead Road; Harrington Street; Hampstead Road (a minor road which is not the A400 Hampstead Road) and Gordon Street.
- 15.5.13 The main impacts of construction Stage B1 can be summarised as:
- construction traffic associated with the construction works;
 - the temporary loss of parking and loading bays on Robert Street, Stanhope Street, Mackworth Street, Harrington Street and Ampthill Estate; and
 - simultaneous northbound and southbound platform closures on the Northern Line (Charing Cross) branch for a three month period in 2032. With this exception, the public transport impacts in this stage are the same as for 2026 (i.e. as described in Section 15.4).

Rail and underground

Completion of Stage A and the operation of HS2 Phase One services

- 15.5.14 The completion of the Stage A high speed station and the operation of HS2 Phase One services creates a number of significant beneficial effects, which can be summarised as follows:
- increased capacity for rail passengers to and from the conventional and high speed stations resulting from the commencement of HS2 Phase One services. This is a major beneficial significant effect;
 - improved rail journey times between Euston and the Midlands (and the north west) with a journey time saving of 35 minutes to Birmingham with the introduction of HS2 Phase One. This is a major beneficial significant effect;
 - released capacity on the WCML, easing pressure on other passenger rail services and freeing up space for freight. This is a major beneficial significant effect;
 - lower crowding levels on trains to and from the conventional and high speed station as a result of increases in train frequencies with high capacity high speed trains on HS2. This is a major beneficial significant effect;
 - introduction of step-free access to the Victoria line and Northern line (Bank branch). This is a moderate beneficial significant effect;
 - expanded passenger areas and the construction of new escalators and lifts to platforms serving the Victoria line and Northern line (Bank branch) improving access, circulation and capacity. This is a major beneficial significant effect;
 - improved facilities and access to Euston Square underground station as a result of the provision of the new LU entrance in Gordon Street and subway connection. This is a major beneficial significant effect; and
 - increased capacity for bus routes as a result of the bus stands area off A4200 Eversholt Street.
- 15.5.15 Table 32 illustrates the predicted numbers of HS2 boarders and alighters at Euston and Old Oak Common stations for the AM and PM peak periods for HS2 Phase One in 2026.
- 15.5.16 For HS2 Phase One in 2026, 26% of AM peak passengers alight from HS2 services at Old Oak Common with 74% alighting at Euston. There are similar percentages for the combined boarding and alighting passengers in 2041. In the PM peak, 72% of HS2 passengers board at Euston with 28% boarding at Old Oak Common.

Table 32: HS2 boarders and alighters at Euston and Old Oak common stations AM and PM peak periods (HS2 Phase One)

Description	2026 Phase One 07:00-10:00			2026 Phase One 16:00-19:00		
	Board	Alight	Total	Board	Alight	Total
Euston HS2 (departing)	7,415	-	7,415	11,990	-	11,990
Euston HS2 (arriving)	-	11,840	11,840	-	8,450	8,450

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Description	2026 Phase One 07:00-10:00			2026 Phase One 16:00-19:00		
	Board	Alight	Total	Board	Alight	Total
OOO HS2 (departing)	4,380	-	4,380	4,680	-	4,680
OOO HS2 (arriving)	-	4,265	4,265	-	3,080	3,080
Total	11,795	16,105	27,900	16,670	11,530	28,200

15.5.17 The introduction of HS2 Phase One results in changes to the overall use of Euston station, Euston underground station and Euston Square underground station. Table 33 sets out forecast boarding and alighting passenger for the 2026 future baseline and for the HS2 Phase One scenario.

Table 33: 2026 Phase One forecast rail and LU passengers at Euston¹⁶¹

		AM peak period 07:00-10:00	PM peak period 16:00-19:00
Alighting Passengers - rail	NR alighting at Euston future baseline	37,510	15,710
	NR alighting at Euston including HS2 Phase One	42,220 (13%)	17,750 (13%)
	HS2 Phase One alighting (included in NR)	11,840	8,450
Boarding Passengers - rail	NR boarding at Euston future baseline	13,910	37,970
	NR boarding at Euston including HS2 Phase One	14,310 (3%)	40,300 (6%)
	HS2 Phase One boarding (included in NR)	7,415	11,990
Alighting Passengers - LU	LU alighting at Euston underground and Euston Square stations future baseline	48,860	50,800
	LU alighting at Euston underground and Euston Square stations with HS2 Phase One	52,610 (13%)	52,020 (2%)
Boarding Passengers – LU	LU boarding at Euston underground and Euston Square stations future baseline	46,780	45,330
	LU boarding at Euston underground and Euston Square stations with HS2 Phase One	50,650 (8%)	49,540 (9%)
	Euston station (rail and LU, excluding Euston Square station) exit future baseline	24,420	5,755

¹⁶¹ Figures in parentheses represent the percentage increase on the corresponding baseline figure.

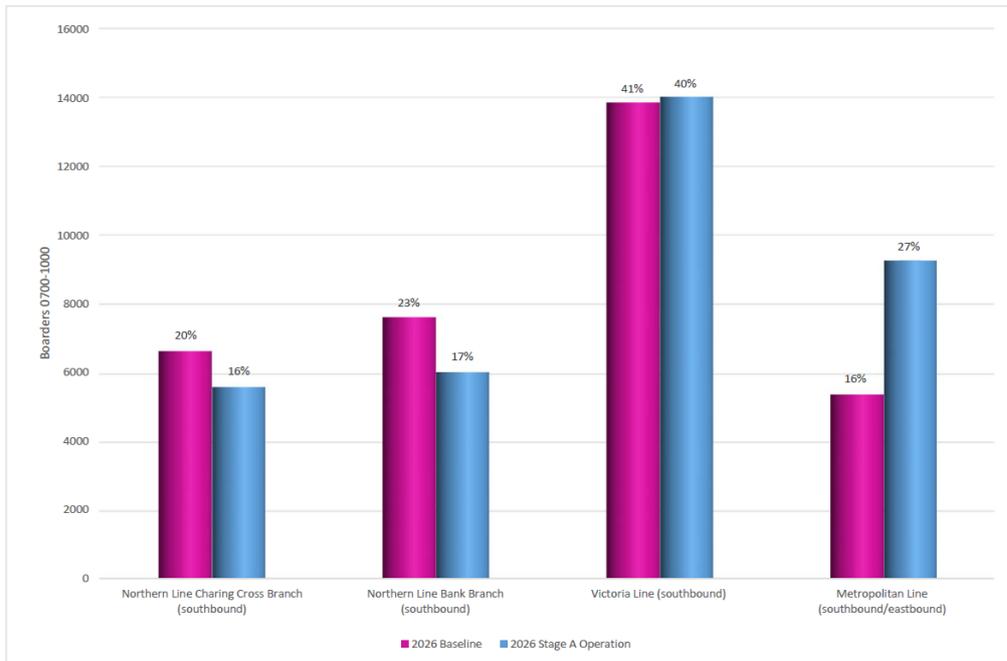
SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

		AM peak period 07:00-10:00	PM peak period 16:00-19:00
Station Exits (excludes interchange between rail and underground lines)	Euston station (rail and LU, excluding Euston Square station) exit with HS2 Phase One	29,280 (+20%)	6,695 (16%)

- 15.5.18 With the introduction of the HS2 Phase One in 2026, rail passengers alighting at Euston station during the AM peak period are forecast to increase from 37,510 to approximately 42,200 passengers (13% increase), compared with the 2026 future baseline. Arrivals at Euston on high speed services in 2026 are forecast to be approximately 11,840.
- 15.5.19 This contributes to changes in the number of passengers exiting Euston station, (rail and LU (excluding Euston Square underground station)) which increase from 24,420 in the future baseline to 29,280 (20% increase).
- 15.5.20 Onward AM peak LU boarders at Euston underground and Euston Square underground stations are forecast to increase from 46,780 in the future baseline to 50,650, or an 8% increase. Whilst the number of AM peak passengers boarding the Northern line (Bank and Charing Cross branches) and Victoria line at Euston underground station decreases by around 5%, boarders onto the Circle, Hammersmith & City and Metropolitan lines via Euston Square underground station increase by 70%.
- 15.5.21 Access mode share analysis has been undertaken to support assessment of the forecast demand on the transport network for taxis, pedestrians and cyclists. The mode share for cycling and walking has been informed by analysis of current mode share trends with the mode share values reflecting future policy.
- 15.5.22 Despite the planned LU upgrades, crowding on services is already predicted to be high in the future baseline situation in 2026 (without HS2 Phase One) – approaching six PPMS on the southbound Northern line (Bank branch) and over five PPMS on the Victoria line. Crowding on the Northern line (Charing Cross branch) and Circle, Hammersmith & City and Metropolitan lines at Euston Square is lower at around four PPMS and three PPMS respectively.
- 15.5.23 The underground lines serving Euston station will be at or above capacity in 2026 without HS2. However, Euston Square underground station and the Metropolitan, Circle and Hammersmith and City lines are less crowded than the Victoria and Northern line branches through Euston. A key part of the revised scheme is improved access to Euston Square underground station, which will capitalise on this available capacity and reduce pressure on the current underground lines directly serving Euston, providing an attractive alternative route to the City. Figure 12 indicates the change in passengers boarding at the underground at Euston and Euston Square stations. The percentage figures represent the proportion of underground passengers using each line in 2026. Of particular note is the increased relative share of Euston Square for passengers boarding these LU services, which increases from 16% to 27% after completion of construction Stage A in 2026. This demonstrates the significant beneficial impacts of improved access to Euston Square underground station in providing an alternative route for passengers accessing both conventional and high speed rail services.

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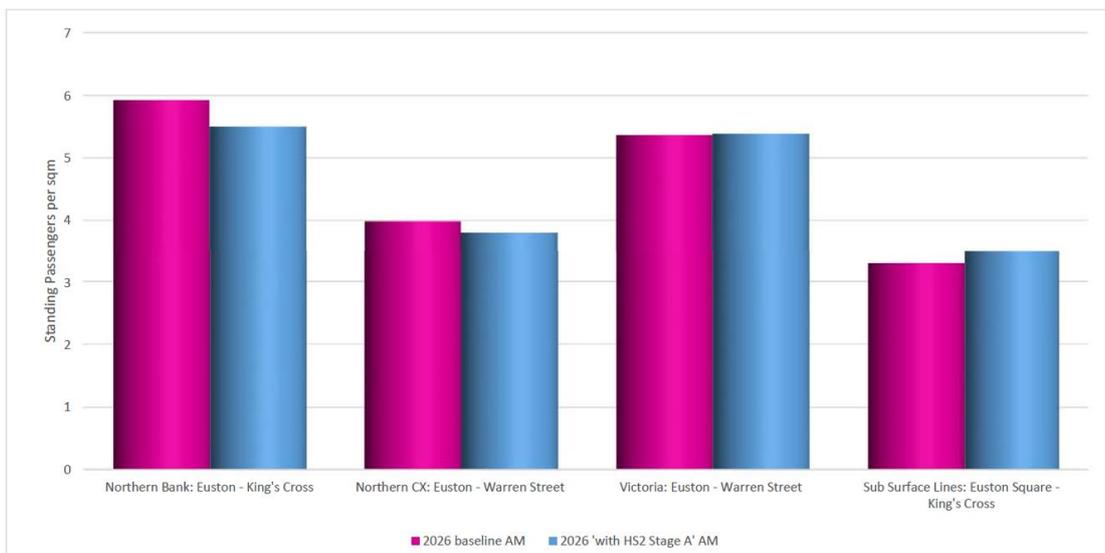
Figure 12: 2026 LU southbound boarders at Euston and eastbound at Euston Square underground stations, 07:00-10:00



(% represents proportion using each line)

- 15.5.24 The new subway connection between the high speed station, Euston underground station and Euston Square underground station results in increased interchange between the conventional and high speed stations and the Circle, Hammersmith & City and Metropolitan lines. As a consequence of this, operation of Phase One of HS2 is forecast to slightly reduce crowding south of Euston station on the Northern line (Bank and Charing Cross branches), have little effect on the Victoria line and slightly increase crowding on the Circle, Hammersmith & City and Metropolitan lines at Euston Square.
- 15.5.25 This is illustrated in Figure 13 which shows crowding south of Euston in the AM peak period for the 2026 future baseline and future baseline plus HS2 Phase One.

Figure 13: 2026 AM Peak crowding LU lines southbound south of Euston. Impact of Hs2 Phase One operation 2026



- 15.5.26 The Stage A station has been evaluated for Phase One operations using both static and dynamic modelling techniques. These analyses demonstrate an improved level of passenger performance throughout the design, showing that the design for Stage A will accommodate the additional demand generated at Euston by the opening of HS2 Phase One, whilst reducing congestion.
- 15.5.27 The Stage A station reduces 2026 crowding levels within the LU station, addressing escalator and ticket hall capacity constraints and reducing congestion when compared to the baseline.
- 15.5.28 Demand changes following opening of HS2 Phase One, which transfers passengers from the conventional to the high speed station, also helps mitigate congestion within the conventional station concourse, reducing congestion when compared to the future baseline.

Construction Stage B1 and HS2 Phase One in operation (2026-2033)

- 15.5.29 During construction Stage B1, the following impacts to the conventional and high speed stations and Euston underground station have been identified:
- passenger routes from the high speed and conventional stations and Euston underground station will be impacted during construction of the revised scheme, with some routes closed for a period and some increases in route length to access areas of public realm and the surrounding public highway network;
 - whilst the vast majority of surface connections can be maintained with no significant effects (increase in travel distance of less than 100m), some walking routes from the conventional station to streets to the west of the high speed station (Drummond Street, Euston Street and Starcross Street) may at times experience increased walking distances of over 100 metres;
 - areas of conventional station accommodation will be relocated to support further reconfiguration of the station to its final platform arrangement on a reduced footprint; and
 - construction of LU improvement works during construction Stage B1 are likely to require some closures of the Northern line (Charing Cross branch) underground platforms although both the requirement for and the duration of any closures will be the subject of joint work with LU. It is currently expected that platform closures would involve simultaneous northbound and southbound platform closures of the Charing Cross branch of the Northern line during construction of the lower lift shaft, lower lobby, cross passage and stair connection. Trains on this line will not stop at Euston for approximately a three-month period from early January 2032 to early April 2032. This will have the following impacts:
 - passengers going to and from Euston station using the Northern line (Charing Cross branches) will need to access the station by other means. Only small changes in passengers numbers are forecast to arrive at Euston on other LU lines, although there will be an increase in passengers walking to and from Euston from Kings Cross St. Pancras and Warren Street. There will also be an increase in bus demand on

routes parallel to the Northern line (Charing Cross branch), notably along A4200 Southampton Row and A400 Gower Street. The diversion of these passengers is forecast to have limited impacts on crowding;

- with the Northern line (Charing Cross branch) platform closure, some passengers who would have interchanged at Euston are likely to interchange at Camden Town between the two Northern line branches. Interchange at Warren Street is forecast to increase as passengers interchange from the Victoria line back onto the Northern line (Charing Cross branch). These will result in increases to end to end journey times for some passengers; and
- the Northern line (Charing Cross branch) platform closures will affect more than 20 tph and impact more than 10,000 passengers/day. For passengers needing to change route due to the platform closures, the average percentage change in end-to-end journey times is likely to be less than 5%. However, based on the duration of platform closures, the number of passengers who will be affected and the expected congestion this will result in a moderate adverse significant effect.

Highways (2026-2033)

15.5.30 The permanent impacts on roads and footways in the Euston area upon completion of construction Stage A at the end of 2026 will be:

- the permanent removal or reduction of parking and loading on sections of Varndell Street, Harrington Street, Granby Terrace Bridge, Mornington Crescent, Drummond Street, Starcross Street, Cobourg Street, Barnby Street, Gordon Street, Euston Street, Cardington Street and Melton Street; and
- permanent road closures and associated diversions around Euston at the following locations:
 - Cardington Street will be permanently closed to vehicles and pedestrians for its entire length;
 - Melton Street (south of Cardington Street) will be permanently closed to vehicles and pedestrians from the junction with Euston Street to the new bus station access;
 - Stephenson Way (northern end) will be permanently closed to vehicles and pedestrians at the junction with Euston Street. Connection may be maintained with the realigned Cobourg Street;
 - a section of Drummond Street will be permanently closed to vehicles and pedestrians between Cardington Street and Cobourg Street, though connection may be maintained with the realigned Cobourg Street;
 - a section of Euston Street will be permanently closed to vehicles and pedestrians between Cardington Street and Cobourg Street, though connection may be maintained with the realigned Cobourg Street;
 - the eastern section of Varndell Street will be permanently closed to vehicles at the junction with A400 Hampstead Road, but pedestrian and cycle access will be maintained;
 - Harrington Street will be permanently closed at the junction with Granby Terrace;

- a minor road called Hampstead Road (which is not the A400 Hampstead Road) will be permanently closed to vehicles and pedestrians between junction with Cardington Street and A400 Hampstead Road; and
- Gordon Street will be permanently closed to vehicles at the junction with A501 Euston Road, but pedestrian and cycle access will be maintained.

- 15.5.31 Assessment of the operation of HS2 Phase One includes taxi operations together with the permanent realignment and/or reconfiguration of highways around Euston including realignment of A400 Hampstead Road/A400 Hampstead Road Bridge, Granby Terrace Bridge and Mornington Terrace Bridge which will be delivered on completion of construction Stage A at the end of 2026 to accommodate the revised scheme.
- 15.5.32 The mode share for taxi travel has been derived from analysis of the 2012 baseline situation and reflects the higher taxi mode share associated with longer distance rail services. The mode share for private vehicle movements reflects the removal of the basement car parking facility at Euston station. Given the absence of car parking and the low level of car pick-up/set-down demand, the main change to traffic generated by the revised scheme is in relation to taxis.
- 15.5.33 The forecast passenger demand for both conventional and high speed passengers in 2026 that will be dropped-off or picked-up by taxi at Euston station are shown in Table 34. The table shows the demand for both the AM and PM peak hours.

Table 34: 2026 HS2 Phase One taxi passenger demand

	AM peak hour 08:00-09:00		PM peak hour 17:00-18:00	
	Pick-up from station	Drop-off at station	Pick-up from station	Drop-off at station
Conventional rail plus LU	328	96	277	370
HS2 Phase One	243	141	175	262
Total	571	237	452	633

- 15.5.34 Table 35 shows the forecast peak hour taxi movements to and from the station for both conventional and high speed stations in 2026. Set in the context of local traffic flows, these are relatively small changes.

Table 35: 2026 HS2 Phase One forecast peak hour taxi set down and pick up (vehicles) from all rail

	AM peak hour 08:00-09:00		PM peak hour 17:00-18:00	
	Pick-up from station	Drop-off at station	Pick-up from station	Drop-off at station
Conventional rail plus LU	149	64	173	195
HS2 Phase One	110	94	109	138
Total	260	158	282	333

15.5.35 The diversion of traffic associated with these changes, combined with the increases to taxi flows leads to flow changes on the highway network which will result in changes to delays at junctions. The junctions with significant increases in delay following completion of construction Stage A are predicted to be:

CFA1

- A4200 Eversholt Street/A4200 Grafton Place (minor adverse significant effect) – AM peak;
- A501 Euston Road/Chalton Street (minor adverse significant effect) – PM peak;
- A501 Euston Road/Ossulston Street (minor adverse significant effect) – AM peak;
- Phoenix Road/Chalton Street (minor adverse significant effect) – PM peak;
- A4200 Eversholt Street/A400 Oakley Square – AM peak (minor adverse significant effect) and PM peak (moderate adverse significant effect);
- A4201 Portland Place/Devonshire Street (moderate adverse significant effect) – PM peak;
- A501 Euston Road/Duke's Road (moderate adverse significant effect in 2026, minor adverse significant effect in 2031) – PM Peak;
- A400 Gower Street/Torrington Place – AM peak (moderate adverse significant effect) and PM peak (major adverse significant effect);
- A400 Tottenham Court Road/Warren Street – AM peak and PM peak (major adverse significant effect);
- A501 Euston Road (westbound)/A400 Hampstead Road (major adverse significant effect) – PM Peak; and
- A501 Euston Road/A4200 Eversholt Street – AM peak (minor adverse significant effect) and PM peak (major adverse significant effect).

15.5.36 In addition to the junctions affected by significant increases in delay with the completion of construction Stage A and operation of Phase One HS2 services at the end of 2026, there is one additional junction that will experience significant increases in delay in Stage B1 construction and operation in CFA 1, namely A501 Marylebone Road / Baker Street (minor adverse significant effect) – AM peak. Additional delay at this junction is caused by construction traffic associated with the construction of Stage B1.

15.5.37 The reconfiguration of roads around the station and changes in traffic due to construction Stage B1 and operation of HS2 Phase One is forecast to result in significant increases in peak hour traffic flow (more than 10% for all vehicles) that will result in a significant increase in traffic-related severance for non-motorised users resulting from these increased flows. The locations of these roads in CFA1 are shown in Table 36. The locations of these roads outside CFA1 are shown in Table 37.

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Table 36: Roads with increased traffic flow resulting in increased traffic-related severance, 2026 and 2031 (CFA1)

Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
A400 Gower Street– Bloomsbury Street (north of Torrington Place)	CFA1	major adverse	major adverse	major adverse	major adverse
A400 Hampstead Road	CFA1	major adverse	major adverse	major adverse	major adverse
A400 Harrington Square/Lidlington Place	CFA1	n/a	n/a	n/a	moderate adverse
A4200 Eversholt Street/Euston Square	CFA1	major adverse	major adverse	major adverse	major adverse
A4200 Russell Square	CFA1	n/a	moderate adverse	n/a	moderate adverse
A4200 Upper Woburn Place– Tavistock Square	CFA1	major adverse	major adverse	major adverse	major adverse
A4201 Albany Street	CFA1	major adverse	major adverse	major adverse	major adverse
A4201 Osnaburgh Street	CFA1	major adverse	major adverse	major adverse	major adverse
A4201 Parkway (west of Delancey St)	CFA1	n/a	n/a	moderate adverse	n/a
A501 Euston Road (east of Melton Street)	CFA1	moderate adverse	moderate adverse	n/a	moderate adverse
A501 Euston Road (Euston Circus slips)	CFA1	major adverse	major adverse	major adverse	major adverse
A5200 Gray's Inn Road (north of Guilford St)	CFA1	n/a	major adverse	n/a	major adverse
A5202 Pancras Road	CFA1	n/a	moderate adverse	n/a	Moderate adverse
A5205 St. John's Wood Road (west of Cunningham Place)	CFA1	n/a	moderate adverse	n/a	moderate adverse
Arlington Road	CFA1	moderate adverse	n/a	moderate adverse	n/a
B502 Brunswick Square/Lansdowne Terrace/B504 Grenville Street	CFA1	major adverse	moderate adverse	major adverse	moderate adverse

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Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
B504 Judd Street	CFA1	major adverse	moderate adverse	major adverse	moderate adverse
Bayham Street	CFA1	n/a	moderate adverse	n/a	moderate adverse
Bedford Place	CFA1	n/a	moderate adverse	n/a	moderate adverse
Bidborough Street	CFA1	moderate adverse	moderate adverse	moderate adverse	moderate adverse
Bolsover Street	CFA1	moderate adverse	n/a	moderate adverse	n/a
Byng Place	CFA1	major adverse	n/a	major adverse	n/a
Chalton Street	CFA1	n/a	n/a	n/a	moderate adverse
Cleveland Street	CFA1	moderate adverse	n/a	moderate adverse	n/a
Cobourg Street	CFA1	major adverse	major adverse	major adverse	major adverse
Cumberland Market	CFA1	n/a	moderate adverse	n/a	moderate adverse
Drummond Street (west of North Gower Street)	CFA1	moderate adverse	n/a	moderate adverse	n/a
Euston Street (east of Cobourg Street)	CFA1	major adverse	major adverse	major adverse	major adverse
Grafton Way	CFA1	n/a	moderate adverse	n/a	moderate adverse
Granby Terrace	CFA1	n/a	moderate adverse	n/a	moderate adverse
Longford Street	CFA1	n/a	moderate adverse	n/a	moderate adverse
Mabledon Place	CFA1	moderate adverse	moderate adverse	moderate adverse	n/a
Midland Road	CFA1	n/a	moderate adverse	n/a	moderate adverse

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
Mornington Street	CFA1	moderate adverse	n/a	moderate adverse	n/a
North Gower Street	CFA1	moderate adverse	n/a	moderate adverse	n/a
Ossulston Street	CFA1	moderate adverse	moderate adverse	moderate adverse	n/a
Phoenix Road	CFA1	n/a	moderate adverse	n/a	n/a
Polygon Road	CFA1	moderate adverse	moderate adverse	moderate adverse	n/a
Regent's Park Outer Circle	CFA1	n/a	moderate adverse	n/a	moderate adverse
Robert Street	CFA1	n/a	major adverse	n/a	major adverse
Russell Square	CFA1	n/a	moderate adverse	n/a	moderate adverse
Stanhope Street	CFA1	major adverse	moderate adverse	major adverse	moderate adverse
Tavistock Place	CFA1	n/a	minor adverse	n/a	major adverse
Torrington Place	CFA1	major adverse	major adverse	major adverse	major adverse
Upper Wimpole Street	CFA1	n/a	major adverse	n/a	major adverse
Wimpole Street	CFA1	n/a	moderate adverse	n/a	moderate adverse

Table 37: Roads with increased traffic flow resulting in increased traffic-related severance, 2026 and 2031 (outside CFA1)

Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
A503 Bayham Street	CFA2	moderate adverse	n/a	moderate adverse	n/a
A503 Camden Road	CFA2	moderate adverse	n/a	moderate adverse	n/a
A503 Delancey Street	CFA2	moderate adverse	n/a	moderate adverse	n/a
A503 Pratt Street	CFA2	moderate adverse	n/a	moderate adverse	n/a

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Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
A5200 York Way	CFA2		moderate adverse		moderate adverse
B413 Clifton Gdns/ Formosa Street/ Shirland Road/Warwick Ave	CFA4	n/a	moderate adverse	n/a	major adverse
Sutherland Avenue	CFA4	n/a	moderate adverse	n/a	moderate adverse

15.5.38 The reconfiguration of roads around the station and changes in traffic due to construction Stage B1 and operation of HS2 Phase One is also forecast to result in significant reductions in daily traffic flow, (more than 10% for all vehicles) that will in turn cause a significant reduction in traffic-related severance for non-motorised users resulting from these decreased flows. The locations of these roads in CFA1 are shown in Table 38. There are no significant reductions in traffic-related severance outside CFA1.

Table 38: Roads with traffic flow reductions resulting in reduced traffic-related severance, 2026 and 2031 (CFA1)

Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
A4200 Russell Square	CFA1	major beneficial	n/a	major beneficial	n/a
A4200 Southampton Row (north of Bloomsbury Way)	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
A4200 Woburn Place–Russell Square	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
A5200 Gray's Inn Road (north of Guilford St)	CFA1	moderate beneficial	n/a	moderate beneficial	n/a
B502 Guilford Street	CFA1	moderate beneficial	moderate beneficial	moderate beneficial	moderate beneficial
B512 Crowndale Road	CFA1	moderate beneficial	n/a	moderate beneficial	n/a
Bedford Way	CFA1	major beneficial	moderate beneficial	major beneficial	moderate beneficial
Drummond Street (east of North Gower Street)	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
Endsleigh Street	CFA1	major beneficial	moderate beneficial	major beneficial	moderate beneficial
Euston Street (west of Cobourg Street)	CFA1	moderate beneficial	moderate beneficial	moderate beneficial	moderate beneficial

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Road name	CFA	Stage A operation		Construction Stage B1 & HS2 Phase One	
		AM	PM	AM	PM
A4200 Russell Square	CFA1	major beneficial	n/a	major beneficial	n/a
Gordon Street–Gordon Square	CFA1	major beneficial	major beneficial	major beneficial	major beneficial
Endsleigh Gardens	CFA1	major beneficial	major beneficial	major beneficial	major beneficial
Granby Terrace	CFA1	moderate beneficial	n/a	moderate beneficial	n/a
Great Russell Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
Knox Street	CFA1	n/a	n/a	n/a	moderate beneficial
Longford Street	CFA1	moderate beneficial	n/a	moderate beneficial	n/a
Maple Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
Montague Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
North Gower Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
Oakley Square	CFA1	minor beneficial	n/a	minor beneficial	n/a
Park Village East	CFA1	moderate beneficial	moderate beneficial	moderate beneficial	moderate beneficial
Plender Street	CFA1	moderate beneficial	n/a	n/a	n/a
Robert Street	CFA1	moderate beneficial	n/a	moderate beneficial	n/a
Tavistock Place	CFA1	major beneficial	n/a	major beneficial	n/a
Tavistock Square	CFA1	major beneficial	major beneficial	major beneficial	major beneficial
University Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
Upper Montagu Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
Varndell Street	CFA1	n/a	moderate beneficial	n/a	moderate beneficial
York Street	CFA1	n/a	n/a	n/a	moderate beneficial

15.5.39 Construction Stage B1 is forecast to result in increases in daily HGV traffic flow on certain routes in the Euston area by more than 30%. These increased flows will result in a significant increase in traffic-related severance for non-motorised users. The location of the roads that are significantly affected are:

CFA1

- Stanhope Street (minor adverse significant effect);
- A400 Gower Street–Bloomsbury Street (moderate adverse significant effect);
- A4200 Upper Woburn Place–Tavistock Square (moderate adverse significant effect);
- University Street (moderate adverse significant effect); and
- Gower Place (major adverse significant effect).

CFA3

- Gloucester Avenue (moderate adverse significant effect);
- Carlton Hill (major adverse significant effect); and
- Regent's Park Road (major adverse significant effect).

15.5.40 There are no effects as a result of increases in daily HGV traffic in CFA2 or CFA4.

15.5.41 The permanent closure of roads as a result of completion of construction Stage A and impacts of construction Stage B1 will also have beneficial effects in reducing daily HGV traffic flow on some routes by more than 30%. This will in turn cause a significant reduction in traffic-related severance for non-motorised users resulting from these reduced flows. The locations of these roads in CFA1 are as follows:

- A400 Hampstead Road (south of A400 Oakley Square) – major beneficial significant effect;
- A501 Euston Road (Euston Circus slips) – major beneficial significant effect;
- A404 Harrow Road (Edgware Road) – moderate beneficial significant effect;
- A5205 St John's Wood Road – major beneficial significant effect;
- Drummond Street (east of North Gower Street) - moderate beneficial significant effect;
- Gordon Street–Gordon Square – major beneficial significant effects;
- Endsleigh Gardens – moderate beneficial significant effect; and
- North Gower Street – moderate beneficial significant effect.

15.5.42 There will not be any beneficial effects resulting from reduced HGV flows outside CFA1.

Parking and loading

15.5.43 Completion of construction Stage A at the end of 2026 will result in a permanent loss of on-street parking on a number of local roads. The locations where the effects are significant are:

- Granby Terrace Bridge (major adverse significant effect) – a permanent loss of approximately 19 residential permit holder bays and seven pay and display

bays;

- Drummond Street (moderate adverse significant effect) – a permanent loss of approximately seven residential permit holder bays, seven motorcycle bays, one loading bay and one pay and display bay;
- Cobourg Street (major adverse significant effect) – a permanent loss of approximately 19 residential permit holder bays;
- Gordon Street (major adverse significant effect) – a permanent loss of approximately two loading bays;
- Cardington Street (major adverse significant effect) – a permanent loss of 45 pay and display bays, one car club bay, one coach bay, four taxi bays and two bus stands; and
- Melton Street (major adverse significant effect) – a permanent loss of three car club bays.

15.5.44 The Stage A station does not replace the 217 spaces removed from the public car park at the conventional station. This loss of off-street parking will be a major adverse significant effect, although restricting parking at central London stations will generally help promote sustainable travel to Euston and other stations.

15.5.45 The closure of the existing car park at the conventional station will result in loss of three disabled parking spaces, but these spaces will be reprovided and the effect is not significant.

15.5.46 Completion of construction Stage A will result in a permanent loss of approximately 100 spaces associated with the demolition of the Hotel Ibis and its car park. This loss of off-street parking will be a major adverse significant effect, although the parking needs of the hotel are also removed and restricting parking will generally help promote sustainable travel to the Euston area.

15.5.47 There will be some additional temporary effects on parking associated with construction Stage B1 and the continued presence of satellite construction compounds near Granby Terrace Bridge (Granby Terrace overbridge satellite compound) and at the Amphthill Estate (A400 Hampstead Road overbridge (south) satellite compound). The significant effects of these are:

- Robert Street (moderate adverse significant effect) with a temporary loss of 21 pay and display bays and one residential permit holder bay on the north side of the road, in addition five pay and display bays will be converted to residential permit holder bays on the south side of the road to offset the loss on Stanhope Street;
- Stanhope Street (moderate adverse significant effect) a temporary loss of 20 residential permit holder bays and four pay and display bays, five pay and display bays on the south side of Robert Street will be converted into residential permit holder bays to offset part of the loss;
- Mackworth Street (moderate adverse significant effect) a temporary loss of 16 residential permit holder bays;

- Harrington Street (moderate adverse significant effect) a temporary loss of ten residential permit holder bays (three of which will be a permanent loss) and two pay and display bays; and
- Amptill Estate (major adverse significant effect) temporary loss of approximately 64 private parking spaces.

Accidents and safety

- 15.5.48 Increased flows on major roads and through junctions can bring a commensurate increase in potential accident risk. In 2026 (the end of construction Stage A and commencement of HS Phase Operation) and 2031 (scenario 4) during operation of Hs2 Phase One there will be a significant effect on accident risk at A400 Hampstead Road/Robert Street (minor adverse effect in 2026 and 2031) as a result of the expected changes in daily traffic flows. Although traffic will increase on A400 Hampstead Road, this road has provision for safe crossing facilities at junctions and signalised pedestrian crossings which will help to mitigate the minor adverse significant effect.

Buses

- 15.5.49 Whilst there are not expected to be significant impacts on the existing Euston bus station operations during construction Stage B1, works will be required to the junction of Melton Street and A501 Euston Road to construct the new access to the linear bus station. The effect of these works is not significant.
- 15.5.50 On completion of construction Stage A at the end of 2026, the additional delay at certain junctions, such as Euston Circus, will result in the following significant effects on the following bus services:
- route 10 (eastbound) – moderate adverse significant effect in the PM peak hour;
 - route 24 (northbound) – moderate adverse significant effect in the PM peak hour;
 - route 29 (northbound) – moderate adverse significant effect in the PM peak hour;
 - route 73 (northbound) – moderate adverse significant effect in the PM peak hour;
 - route 134 (northbound) – moderate adverse significant effect in the PM peak hour;
 - route 390 (northbound) – moderate adverse significant effect in the PM peak hour;
 - route 14 (northbound) – moderate adverse significant effect in the PM peak hour; and
 - route C19 (westbound) – minor adverse significant effect in the AM peak and PM peak hours.
- 15.5.51 With the addition of construction activities during construction Stage B1, the effects on bus services are unchanged from this, with the exception of route C19 (westbound)

with a minor adverse significant effect in the AM peak and moderate adverse significant effect in the PM peak.

15.5.52 There will be no other significant effects on public transport delays within this area.

Pedestrians

15.5.53 The revised scheme will deliver substantial improvements for pedestrians on completion of construction Stage A at the end of 2026 including:

- a subway linking Euston station to Euston Square underground station, which will reduce demand on busy footways and will include lifts that will provide step-free access (minor beneficial significant effect);
- a subway linking Euston station to Gordon Street, which will reduce demand on busy highway crossings (minor beneficial significant effect);
- closure of the north end of Gordon Street at its junction with A501 Euston Road to motor vehicles, to create a shared pedestrian/cycle traffic-free route;
- a new high speed station entrance via Cobourg Street will improve walking accessibility from the north and connections with A400 Hampstead Road bus services (minor beneficial significant effect); and
- improved pedestrian and cycle crossings of A400 Hampstead Road.

15.5.54 Four paths are affected by the completion of construction Stage A at the end of 2026 as follows:

- the pedestrian section of Harrington Street will be permanently closed and is occupied by Granby Terrace overbridge satellite compound during construction Stage B1. The footpath is associated with buildings that will be demolished during construction Stage A. Alternatives routes are available;
- the path between A400 Hampstead Road leading into St James's Gardens will be permanently closed and replaced by a new area of public realm and access to the Cobourg Street high speed station entrance and cycle parking. An alternative route to the two paths across St James's Gardens to access the high speed station will be provided via the northern end of Cobourg Street; and
- two paths across Euston Square Gardens (one to the east and one to the west) will be available on a temporary alignment to provide access to the conventional and high speed stations.

15.5.55 The effects on these paths are not significant.

15.5.56 During construction Stage B1, temporary diversions to walking routes from the conventional station to streets to the west of the high speed station (Drummond Street, Euston Street, Starcross Street and Stephenson Way) may at times result in increased walking distances of over 100 metres. This is a minor adverse significant effect.

Cycling

- 15.5.57 Predictions of cycle use to and from Euston station are based on the current profile of cycling destinations and a 7% target modal share for both baseline and the revised scheme. Cycle flows to and from Euston station are expected to increase following the opening of HS2 Phase One at the end of 2026. In the AM peak hour the flows are predicted to increase by about 14 cyclists (a 3% increase compared to baseline) to the station and about 152 cyclists (12%) from the station, and the PM peak hour cycle flows are predicted to increase by about 110 cyclists (6%) to the station and about 34 cyclists (13%) from the station.
- 15.5.58 Increased demand for cycle parking at Euston station will be delivered by the revised scheme by the end of 2026 by providing more cycle parking facilities. The conventional station currently provides 310 public cycle parking spaces and this will be increased to some 1000 public cycle parking spaces across both the high speed and conventional stations. This would not otherwise be provided and is a major beneficial significant effect.

Cumulative effects

- 15.5.59 The assessment includes for the cumulative effects of planned development during construction Stage B1 and the operation of HS2 Phase One.
- 15.5.60 The assessment also includes for in-combination effects by taking into account transport impacts as a result of the revised scheme in neighbouring CFA areas. However, there are no impacts from adjacent CFAs.

Other mitigation measures

- 15.5.61 Changes in traffic flows will lead to an increase in delays to vehicle occupants at a number of junctions in 2026. However, most signalised junctions in central London are under adaptive control which will optimise the signal stages in real time. This means that many of those junctions with a minor significant effect will be mitigated through adaptive control, although this is most effective where there is minimal net increase in traffic through the junction.
- 15.5.62 It should be noted that in most locations where increased traffic flows result in increases in traffic-related severance there are dedicated crossing facilities which will mitigate or remove these effects.
- 15.5.63 In order to minimise disruption of platform closures on the Northern line (Charing Cross branch), mitigation would include advance warning of platform closures through the media and TfL's journey planner, together with announcements on affected lines and signage at stations along these lines informing passengers of available alternatives. Bus services frequencies could be modified in the Euston and Warren Street area to assist passengers walking between the stations and signage and wayfinding introduced to increase awareness of alternative routes to and from the conventional and high speed stations.
- 15.5.64 Additional delays to bus routes have been identified as a result of construction activities, which cause significant effects on seven bus routes. The majority of the additional delays take place on Tottenham Court Road, in particular at its junction with Euston Circus and Warren Street. With changes to the signal times at these two

junctions through adaptive control the additional delay can be reduced, which would mean these effects would not be significant.

15.5.65 A review of pedestrian crossing timings could facilitate improved area connectivity and permeability in collaboration with LBC and TfL.

15.5.66 A high speed station travel plan will be developed as a tool for improving access to and from Euston station and minimising motorised access.

15.5.67 The scope of the travel plan will include:

- access and egress to the station for passenger travel;
- employee travel, including rail staff and others working on the site such as retail staff, security and policing, and cleansing contractors; and
- servicing and maintenance including deliveries.

15.5.68 The objectives of the travel plan can be summarised as:

- to encourage access by walking, cycling and public transport;
- to monitor facilities and infrastructure that supports access by walking, cycling and public transport within the station site and its surrounding area;
- to manage taxi travel to the site by providing and monitoring dedicated and controlled facilities for pick up and drop off; and
- to work in partnership with the local authority and other stakeholders to develop measures and promotional strategies to encourage sustainable travel.

Summary of likely residual significant effects (2026–2033)

15.5.69 There will be beneficial impacts of opening of the first six high speed platforms at the end of 2026 as a result of improved journey times on HS2 to the Midlands and beyond; lower crowding levels on trains to and from the conventional station as a result of increases in train frequencies and released capacity on other rail services easing pressure on the WCML with resultant reliability benefits.

15.5.70 Following the opening of the first six high speed platforms at the end of 2026, additional demand on the LU network will lead to delay for passengers of LU lines at Euston station.

15.5.71 The opening of the first six high speed platforms at the end of 2026 will provide benefits at stations and interchanges associated with the transfer to HS2 of passengers of long distance services who previously would have used WCML services. There will be improvements in accessibility in the new high speed station concourses; improved platform access as a result of improvements to Euston underground station and the provision of new escalators and step-free access and to the underground, Victoria and Northern (Bank branch) lines; improved facilities and access to Euston Square underground station as a result of the provision of a new Gordon Street underground station entrance and subway connection, and increasing capacity for bus routes as a result of the additional bus stands off A4200 Eversholt Street.

- 15.5.72 Works at Euston underground station will require the temporary simultaneous closure of the northbound and southbound Northern line (Charing Cross branch) platforms for a three month period in early 2032.
- 15.5.73 On completion of construction Stage A and during Stage B1 construction and operation (of HS2 Phase One) public transport delay due to bus route changes and diversions will occur on the following bus routes: route 10 (eastbound), route 24 (northbound), route 29 (northbound), route 73 (northbound), route 134 (northbound), route 390 (northbound), route 14 (northbound) and route C19 (westbound). These effects can be mitigated through changes to signal control as part of adaptive control measures.
- 15.5.74 Changes in traffic flows will result from permanent road closures, changes to the local road network and relocated and increased taxi operations, together with construction traffic generated by the construction of the revised scheme. Increases in traffic flows will mainly be concentrated on some roads to the east of Euston station in the Somers Town and King's Cross area, on A400 Hampstead Road between A501 Euston Road and the taxi rank on Cobourg Street, on the A501 Euston Road, A4201 Albany Street, to the immediate west of the station, as well as in the Regent's Park and Camden Town areas. In addition there will be increases in traffic on some roads to the south of the A501 Euston Road, particularly A400 Gower Street and B504 Judd Street.
- 15.5.75 The diversion impacts of road closures result in decreases in traffic which will mainly be concentrated on some roads to the south of A501 Euston Road between Gordon Street and A4200 Upper Woburn Place and on Tavistock Square, on A400 Hampstead Road to the north of the taxi rank on Cobourg Street and in the Camden Town area between A400 Camden Road and A5202 St. Pancras Way. Reductions in traffic flows on these roads will result in improvements for pedestrians crossing the road.
- 15.5.76 Completion of construction Stage A at the end of 2026 construction will result in permanent effects on heavily used parking and loading facilities at the following locations: Granby Terrace Bridge; Drummond Street; Cobourg Street; Gordon Street; Cardington Street and Melton Street. In addition, public parking associated with the conventional station car park will be removed.
- 15.5.77 There will be some additional effects on heavily used parking and loading facilities associated with construction Stage B1 at the following locations: Robert Street, Stanhope Street, Mackworth Street, Harrington Street and the Ampthill Estate.
- 15.5.78 The Stage A station completed at the end of 2026 includes increased cycle parking capacity at the high speed station and improvements to cycle and walk routes on roads surrounding both stations which lead to reductions in delay and improvements to amenity and ambience.
- 15.5.79 Severance to users of non-motorised modes will be experienced at times during construction Stage B1 to streets to the west of the station Drummond Street; Euston Street; and Starcross Street.
- 15.5.80 A potential increase in accident and safety risks has been identified at the A400 Hampstead Road/Robert Street junction. This is a minor significant adverse effect.

15.5.81 The significant effects that result from operation of HS2 Phase One in 2026 and are shown on Map Series TR-04-001 (SES2 and AP3 Volume 5, Traffic and transport, CFA1 Map Book).

15.5.82 The significant effects that result from combined construction Stage B1 and HS2 Phase One operation (2026 to 2033) and are shown on Map Series TR-05-001 (SES2 and AP3 Volume 5, Traffic and transport, CFA1 Map Book).

15.6 Effects arising during Phase 2 operation (2041)

15.6.1 The previous section presents the effects of operation of HS2 Phase One services in 2026. These effects will also apply largely unchanged following completion of the high speed station. However, with the completion of Stage B1, it will be possible to operate Phase Two HS2 services. The high speed station will be completed in 2033 for the planned opening of Phase Two of high speed services.

15.6.2 This section presents an assessment of the likely environmental effects of the full operation of the revised scheme in 2041, 15 years from the completion of construction Stage A and opening of HS2 Phase One services at the end of 2026.

15.6.3 Table 39 illustrates the predicted numbers of HS2 boarders and alighters at Euston and Old Oak Common stations for the AM and PM peak periods for Phase Two services in 2041.

15.6.4 For HS2 Phase Two in 2041, 23% of AM peak passengers alight from HS2 services at Old Oak Common in with 77% alighting at Euston. In the PM peak, 74% of HS2 passengers board at Euston with 26% boarding at Old Oak Common.

Table 39: HS2 boarders and alighters at Euston and Old Oak Common stations AM and PM peak periods (HS2 Phase Two)

Description	2041 Phase Two 07:00-10:00			2041 Phase Two 16:00-19:00		
	Board	Alight	Total	Board	Alight	Total
Euston HS2 (departing)	17,615	-	17,615	26,460	-	26,460
Euston HS2 (arriving)	-	26,045	26,045	-	18,710	18,710
OOO HS2 (departing)	8,450	-	8,450	9,110	-	9,110
OOO HS2 (arriving)	-	7,925	7,925	-	6,830	6,830
Total	26,065	33,970	60,035	35,570	25,540	61,110

Avoidance and mitigation measures

15.6.5 The following measures have been included as part of the overall design of the revised scheme, delivered by the end of 2033, which will avoid or reduce impacts on transport users:

- the new high speed station and improved LU facilities have been designed to meet HS2 Ltd and LU station design criteria. This will meet the forecast rail passenger demand for 2041, including the HS2 Phase Two demand with allowances for future growth;

- a high speed station that allows for growth beyond 2041 and provides direct and integrated interchange with LU;
- improvements in accessibility, compared with the existing station and reduced crowding levels in the concourse, with additional and improved access points which will be aligned with the surrounding street network;
- a new pedestrian route running north-south across the high speed station concourses and the deck, above the high speed platforms;
- enhanced station operations and interchange, together with the provision of improved facilities for taxis and private car, cycle parking, links to bus services and local community access to the station;
- a new taxi set down and pick up facility will be provided at the A400 Hampstead Road station entrance forecourt with links to both the high speed and conventional stations via the new north-south pedestrian route. The facility is accessed directly from the A400 Hampstead Road. This system will improve operational efficiency of taxi facilities with managed taxi share at peak times, which will help reduce the number of taxis;
- a passenger vehicle set down area will be provided at the Cobourg Street station entrance forecourt and accessed from A400 Hampstead Road / Cobourg Street, a separate set down facility is provided on A4200 Eversholt Street;
- a new pick-up and drop-off facility for mobility impaired passengers will be provided at the Cobourg Street station entrance forecourt with links to assisted travel services within the station;
- reconfiguration of the bus station into a new 'linear bus street' at the front of Euston station. The existing access for eastbound buses from the A501 Euston Road will be closed and moved to Melton Street. The bus station could also accommodate an increased frequency of through bus routes if required;
- additional bus stands north of the conventional station accessed off A4200 Eversholt Street will be opened at end of construction Stage A (2026) and are a permanent feature;
- there will be an increase in the number of cycle parking spaces for station users to approximately 2000 spaces and 200 cycle hire docking stations will be provided to cater for the increased demand for cycle parking at Euston station; and
- improved cycle routes will be available on roads around both stations. A north-south cycle route will be provided as a replacement for the partial loss of LCN route 6a (Cardington Street/Melton Street).

15.6.6 The revised scheme is shown on Map CT-06-001 (SES2 and AP3 Volume 2, CFA1 Map Book).

Assessment of impacts and effects

15.6.7 The main impacts of the revised scheme can be summarised as:

- increases to rail passengers arriving and departing the High Speed station at Euston with consequential increases in onward travel by LU, bus, cycle, walk and taxi;
- permanent road closures and associated diversions around the stations at Euston closed during construction Stage A and a permanent feature;
- the permanent removal or reduction of parking and loading bays;
- the replacement of four paths which will be re-provided either as part of the public realm, public open space or on slightly different alignments;
- increasing capacity for bus routes as a result of an improved linear bus station and additional bus stands off A4200 Eversholt Street to the north of the conventional station; and
- improvements to cycle and walk routes on roads surrounding the station including a new north-south cycle route and a new shared pedestrian/cycle traffic-free route at the northern end of Gordon Street.

Rail and underground

15.6.8 The design of the revised scheme and its operation creates a number of significant beneficial effects, which can be summarised as:

- increased capacity for rail passengers to and from the stations at Euston resulting from the introduction of HS2 Phase Two services. This is a major beneficial significant effect;
- improved journey times on HS2 between Euston and the Midlands and Manchester. With HS2 Phase Two, there are anticipated journey time savings of 50 minutes to Leeds and 1 hour to Manchester. This is a major beneficial significant effect;
- released capacity on the WCML, easing pressure on other passenger rail services and freeing up space for freight. The effect is the same as reported for Stage A;
- lower crowding levels on trains to and from the conventional station at Euston as a result of increases in train frequencies with high capacity HS2 trains. The effect is the same as reported for Stage A;
- with HS2 Phase Two, the transfer to Euston high speed station of passengers who previously would have arrived at King's Cross and St. Pancras International from the north of England will result in some relief to these stations. This is a moderate beneficial significant effect;
- improvements in passenger performance at the high speed and conventional stations:
 - the revised scheme can accommodate forecast high speed usage for 2041 and

beyond at reduced levels of station crowding compared to the conventional station in the 2041 future baseline; and

- demand changes associated with the HS2 Phase Two service also reduce usage of conventional services when compared to the future baseline, reducing anticipated 2041 crowding levels in the conventional station concourse. This is a moderate beneficial significant effect; and
- improvements in passenger performance and accessibility at Euston underground station. The significant beneficial effects of these improvements are the same as those reported for Stage A:
 - introduction of step-free access throughout Euston underground station and Euston Square underground station;
 - increased passenger areas and the construction of new escalators and lifts down to the underground station platforms, improving access, circulation and capacity for Euston underground station; and
 - improved facilities and access to Euston Square underground station as a result of the provision of a new LU station entrance at the Gordon Street underground entrance and subway connection.

15.6.9 Table 40 illustrates the increased use of the stations at Euston, including Euston Square station, with full operation of HS2 in 2041.

Table 40: 2041 Phase Two forecast rail and LU passengers at Euston¹⁶²

		AM peak period 07:00-10:00	PM peak period 16:00-19:00
Alighting Passengers – rail	NR alighting at Euston baseline	44,020	20,150
	NR alighting at Euston including HS2	61,100 (38%)	31,000 (54%)
	HS2 alighting (included in NR)	26,040	18,710
Boarding Passengers – rail	NR boarding at Euston baseline	17,410	44,920
	NR boarding at Euston including HS2	26,620 (53%)	58,930 (31%)
	HS2 boarding (included in NR)	17,620	26,460
Alighting Passengers – LU	LU at Euston underground and Euston Square station baseline	54,660	58,190

¹⁶² Figures in parentheses represent the percentage increase on the corresponding future baseline figure.

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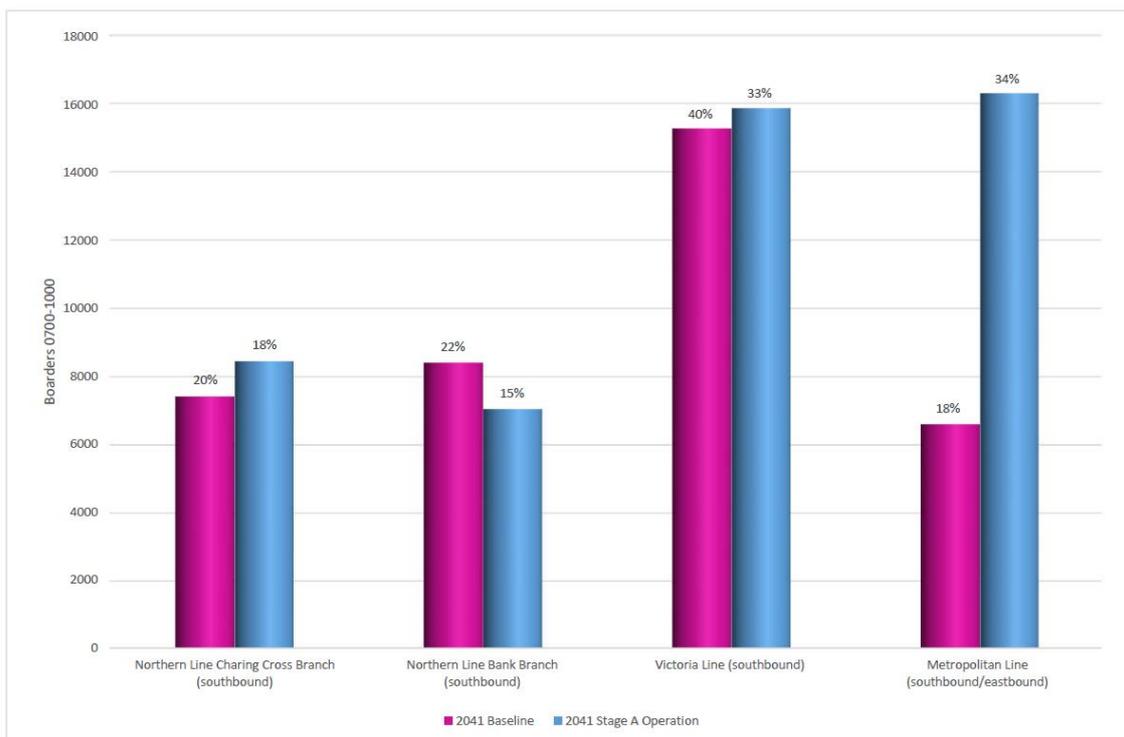
		AM peak period 07:00-10:00	PM peak period 16:00-19:00
	LU alighting at Euston underground and Euston Square station with HS2	67,470 (23%)	71,530 (23%)
Boarding Passengers – LU	LU boarding at Euston underground and Euston Square station baseline	52,695	52,220
	LU boarding at Euston underground and Euston Square stations with HS2	66,160	64,780 (24%)
Station exits (excludes interchange between rail and underground lines)	Euston station (rail and LU, excluding Euston Square station) exit future baseline	28,560	7,250
	(rail and LU, excluding Euston Square station) exit Station exit with HS2	36,569 (+28%)	9,560 (32%)

- 15.6.10 By 2041, AM peak baseline rail passengers alighting at the conventional station are forecast to increase to 44,020. With the introduction of HS2 Phase Two, by 2041 it is estimated that alighting rail passengers will increase to approximately 61,100 (38% increase). Arrivals at Euston on high speed services in 2041 are approximately 26,040. This includes 2,400 passengers arriving at Euston in the AM peak period, who would use rail services at King's Cross Station in the absence of the revised scheme.
- 15.6.11 Station exits from the rail stations and Euston underground station increases from a baseline of 28,560 to 36,570 (28% increase) with the introduction of HS2 Phase Two.
- 15.6.12 By 2041, AM peak baseline LU boarders at Euston underground and Euston Square stations are forecast to increase to 52,695. With the introduction of HS2 Phase Two, this increases to 66,160 (26% increase).
- 15.6.13 By 2041, PM peak baseline rail passengers boarding at Euston station are forecast to increase to 44,920. With the introduction of HS2 Phase Two, by 2041 it is estimated that boarding rail passengers will increase to approximately 58,930 (31% increase). Passengers boarding high speed services at Euston in 2041 are approximately 26,460.
- 15.6.14 By 2041, PM peak baseline LU alighters are forecast to increase to 58,190. With the introduction of HS2 Phase Two, LU alighters will increase to 71,530 (23% increase).
- 15.6.15 Euston station and the underground lines serving it will be at or above capacity in 2041. However, the Metropolitan, Circle and Hammersmith and City lines are much less crowded. A key part of the revised scheme is to improve access to Euston Square underground station, which will capitalise on available capacity and reduce pressure on the current underground lines directly serving Euston, providing an attractive alternative route to the City.
- 15.6.16 The increase in rail users at Euston station with HS2 Phase Two in 2041 and consequent increases in LU users will result in increased passenger volumes on the

Northern line (Bank and Charing Cross branches) and Victoria line at Euston and the Circle, Hammersmith & City and Metropolitan lines via Euston Square underground station.

- 15.6.17 This is shown in Figure 14 which indicates the change in passengers boarding LU at Euston and Euston Square underground stations. The percentage figures represent the percentage of underground passengers using each line in 2041. Of particular note is the increased relative share of Euston Square underground station for passengers boarding these services, which increases from 18% to 34% by 2041. This demonstrates the significant beneficial effects of improved access to Euston Square underground station in providing an alternative route for passengers accessing both high speed and conventional rail services.

Figure 14: LU southbound boarders at Euston and eastbound at Euston Square stations, 07:00-10:00, 2041



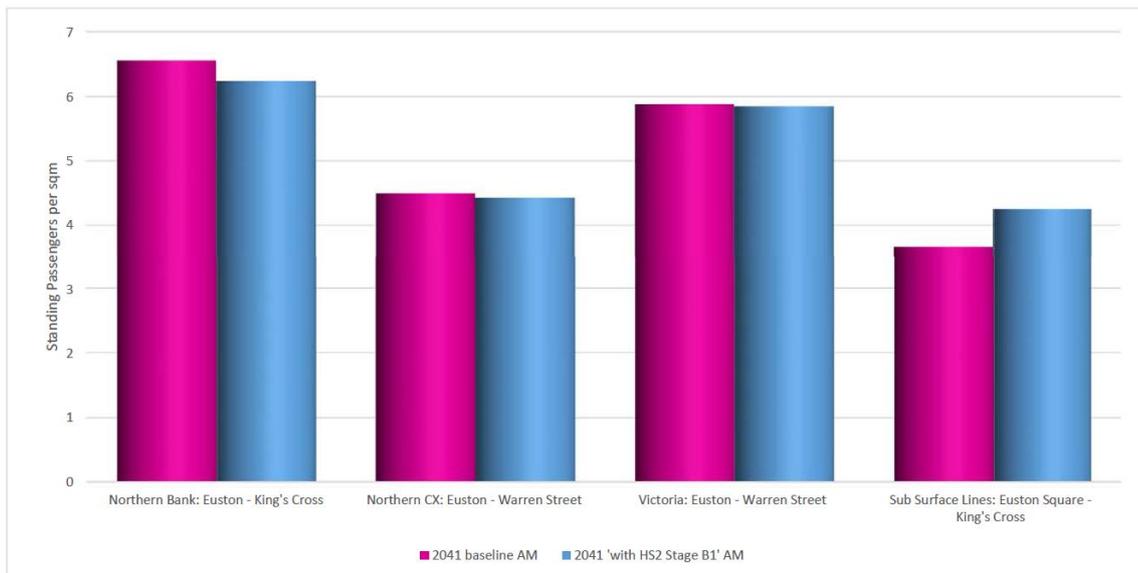
(% represents proportion using each line)

- 15.6.18 Despite the planned LU upgrades, passenger congestion is already predicted to be high in the forecast baseline situation in 2041 – between six and seven PPMS on the southbound Northern line (Bank branch) and almost six on the Victoria line; crowding on the Northern line (Charing Cross branch) and Circle, Hammersmith & City and Metropolitan lines at Euston Square is lower at between four and five PPMS and between three and four PPMS, respectively. This is illustrated in Figure 15 which shows crowding south of Euston in the AM peak period for the 2041 future baseline. The introduction of HS2 Phase Two is forecast to slightly reduce crowding south of Euston station on the Northern line (Bank and Charing Cross branches) in 2041 but have little effect on the Victoria line and would increase crowding on the Circle, Hammersmith & City and Metropolitan lines at Euston Square underground station from between 3 and 4 to just over 4 PPMS.

15.6.19 The new subway connection between Euston underground station and Euston Square underground station results in increased interchange between Euston station and the Circle, Hammersmith & City and Metropolitan lines.

15.6.20 While the increase in crowding is unlikely to increase end to end journey times by more than 10%, public transport delay has been assessed as a minor significant adverse effect as a result of the increase in crowding on the Circle, Hammersmith & City and Metropolitan lines.

Figure 15: AM Peak crowding 2041 LU lines southbound south of Euston (future baseline (2041)/future baseline 2041 plus revised scheme)



15.6.21 There are concerns about both Euston railway and underground stations, in relation to their ability to manage current baseline demand, including at the following locations:

- the main access route within the mainline station concourse during the AM peak;
- the escalator to the southbound Victoria line and Northern line (Bank branch) platforms during the AM peak (throughput greater than 100 passengers per minute);
- restricted circulation for most pedestrians on the existing station concourse during the PM peak; and
- the escalator from northbound Victoria line and Northern line (Bank branch) platforms during the PM peak (throughput greater than 100 passengers per minute).

15.6.22 Forecast growth without HS2 Phase Two suggests that, in the absence of conventional station enhancements, performance in these three critical areas will deteriorate significantly by 2041. As such, these facilities would need to be upgraded, irrespective of the revised scheme. The revised scheme incorporates significant improvements, which will help address these underlying concerns.

15.6.23 The revised scheme has been evaluated for 2041 operations using both static and dynamic modelling techniques. These analyses demonstrate a high level of passenger performance throughout the design showing that the interchange design for the

revised scheme will accommodate the additional demand generated at Euston whilst reducing congestion in comparison to the baseline scenarios.

Highways

- 15.6.24 The increased use of Euston station results in increased taxi use. Taxi mode share has been estimated as described in Section 15.5. Table 41 shows the forecast passenger demand for both conventional and high speed passengers in 2041, who will be dropped-off or picked-up by taxi at Euston station. The table shows the demand for both the AM and PM peak hours.

Table 41: 2041 taxi passenger demand

	AM peak hour 08:00-09:00		PM peak hour 17:00-18:00	
	Pick-up from station	Drop-off at station	Pick-up from station	Drop-off at station
Conventional rail plus LU	376	125	374	447
HS2 Phase Two	535	334	387	581
Total	911	459	761	1028

- 15.6.25 Table 42 shows the forecast peak hour taxi movements to and from the station for 2041. Set in the context of local traffic flows, these are relatively small changes.

Table 42: 2041 forecast peak hour taxi set down and pick up (vehicles) from all rail services

	AM peak hour 08:00-09:00		PM peak hour 17:00-18:00	
	Pick-up from station	Drop-off at station	Pick-up from station	Drop-off at station
Conventional Rail plus LU	171	83	234	235
HS2 Phase Two	243	223	242	306
Total	414	306	476	541

- 15.6.26 Assessment of the revised scheme in 2041 includes these taxi operations together with the realignment and/or reconfiguration of highways around Euston station including realignment of A400 Hampstead Road and A400 Hampstead Road Bridge, Granby Terrace Bridge and Mornington Terrace Bridge to accommodate the revised scheme.
- 15.6.27 The permanent road closures and associated diversions around Euston station and the removal or reduction of parking and loading bays due to the revised scheme are mostly the same as those detailed in Section 15.5. The only additional road closure will be the existing bus station access from A501 Euston Road which will be permanently closed to vehicles and pedestrians when the new linear bus station is opened at the end of construction Stage B1 (end of 2033).
- 15.6.28 The diversion of traffic associated with these changes, combined with the increases to taxi flows leads to flow changes on the highway network that will result in changes to

delays at junctions. The junctions with significant increases in delay in 2041 are predicted to be:

CFA1

- A40 New Oxford Street/Coptic Street (minor adverse significant effect) – PM peak;
- A400 Camden Street/B512 Crowndale Road (minor adverse significant effect) – PM peak;
- A4200 Eversholt Street/A4200 Grafton Place (minor adverse significant effect) – AM peak;
- A4200 Russell Square/Bernard Street (minor adverse significant effect) – AM peak;
- A501 Euston Road/Melton Street (minor adverse significant effect) – PM peak;
- A501 Euston Road/Ossulston Street (minor adverse significant effect) – AM peak;
- A501 Marylebone Road/A41 Gloucester Place (minor adverse significant effect) – PM Peak;
- A5202 Crowndale Road/A5202 Royal College Street (minor adverse significant effect) – PM peak;
- A5204 Goodge Street/Charlotte Street (minor adverse significant effect) – PM peak;
- Marylebone Road/Baker Street (minor adverse significant effect) AM peak;
- A400 Bloomsbury Street / Great Russell Street (moderate adverse significant effect) - PM peak;
- A501 Euston Road/Duke's Road (moderate adverse significant effect) – PM peak;
- A501 Marylebone Road/A4201 Park Crescent (moderate adverse significant effect) – PM peak;
- A400 Gower Street/Torrington Place (major adverse significant effect) – PM peak;
- A400 Tottenham Court Road/A400 Grafton Way (major adverse significant effect) – AM peak;
- A4200 Eversholt Street/A400 Oakley Square (major adverse significant effect) – AM and PM peak;
- A501 Euston Road (westbound)/A400 Hampstead Road (major adverse significant effect) – AM and PM peak;
- A501 Euston Road/A4200 Eversholt Street – AM peak (moderate adverse effect) and PM peak (major adverse significant effect);

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- A501 Euston Road/Chalton Street – AM peak (minor adverse significant effect) and PM peak (major adverse effect); and
- A501 Marylebone Road (eastbound)/Upper Montagu Street (major adverse significant effect) – AM peak.

15.6.29 The reconfiguration of roads around Euston station with the revised scheme including the permanent closure of some roads together with increases in 2041 demand associated with the revised scheme is forecast to result in significant increases in peak hour traffic flow (more than 10% for all vehicles) that will result in a significant increase in traffic-related severance non-motorised users resulting from these increased flows. The locations of these roads in CFA1 are shown in Table 43. The locations of these roads outside CFA1 are shown in Table 44.

Table 43: Roads with increased traffic flow resulting in increased traffic-related severance, 2041 (CFA1)

Road name	CFA	2041	
		AM	PM
A400 Gower Street – Bloomsbury Street (north of Torrington Place)	CFA1	major adverse	major adverse
A400 Hampstead Road	CFA1	major adverse	major adverse
A400 Harrington Square/Lidlington Place	CFA1	moderate adverse	moderate adverse
A4200 Eversholt Street/Euston Square	CFA1	major adverse	major adverse
A4200 Russell Square	CFA1	n/a	moderate adverse
A4200 Upper Woburn Place – Tavistock Square	CFA1	major adverse	moderate adverse
A4201 Albany Street	CFA1	major adverse	moderate adverse
A4201 Osnaburgh Street	CFA1	major adverse	major adverse
A4201 Parkway (west of Delancey Street)	CFA1	major adverse	major adverse
A501 Euston Road (East of Melton Street)	CFA1	moderate adverse	n/a
A501 Euston Road (Euston Circus slips)	CFA1	major adverse	major adverse
A5200 Gray's Inn Rd (north of Guilford Street)	CFA1	major adverse	major adverse
A5202 Pancras Road	CFA1	major adverse	major adverse
A5204 Goodge Street/Mortimer Street	CFA1	n/a	moderate adverse
A5205 St. John's Wood Road (west of Cunningham Place)	CFA1	n/a	moderate adverse

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Road name	CFA	2041	
		AM	PM
Arlington Road	CFA1	moderate adverse	n/a
B502 Bernard Street (east of Marchmont Street)	CFA1	moderate adverse	n/a
B502 Brunswick Square/Lansdowne Terrace/ B504 Grenville Street	CFA1	major adverse	moderate adverse
B504 Judd Street	CFA1	major adverse	major adverse
B512 Crowndale Road	CFA1	n/a	moderate adverse
Bayham Street	CFA1	n/a	moderate adverse
Bidborough Street	CFA1	moderate adverse	moderate adverse
Byng Place	CFA1	moderate adverse	n/a
Camley Street	CFA1	n/a	moderate adverse
Chalton Street	CFA1	n/a	moderate adverse
Cleveland Street	CFA1	n/a	moderate adverse
Cumberland Market	CFA1	n/a	moderate adverse
Drummond Street (west of North Gower Street)	CFA1	moderate adverse	n/a
Eastcastle Street	CFA1	n/a	moderate adverse
Goods Way	CFA1	major adverse	moderate adverse
Grafton Way	CFA1	n/a	moderate adverse
Granby Terrace	CFA1	n/a	moderate adverse
Great Ormond Street	CFA1	n/a	major adverse
Great Russell Street	CFA1	moderate adverse	n/a
Guilford Place	CFA1	n/a	major adverse
Harrison Street	CFA1	n/a	moderate adverse
Longford Street	CFA1	moderate adverse	moderate adverse

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Road name	CFA	2041	
		AM	PM
Mabledon Place	CFA1	moderate adverse	moderate adverse
Marchmont Street	CFA1	moderate adverse	n/a
Margaret Street	CFA1	n/a	moderate adverse
Midland Road	CFA1	n/a	moderate adverse
Mornington Street	CFA1	moderate adverse	moderate adverse
North Gower Street	CFA1	moderate adverse	n/a
Nottingham Place	CFA1	n/a	moderate adverse
Old Gloucester Street	CFA1	n/a	major adverse
Ossulston Street	CFA1	moderate adverse	moderate adverse
Park Village East	CFA1	moderate adverse	moderate adverse
Phoenix Road	CFA1	n/a	major adverse
Plender Street	CFA1	n/a	major adverse
Polygon Road	CFA1	moderate adverse	moderate adverse
Regent's Park Outer Circle	CFA1	moderate adverse	major adverse
Robert Street	CFA1	n/a	moderate adverse
Russell Square	CFA1	n/a	moderate adverse
Seaford Street	CFA1	n/a	moderate adverse
Shelton Street	CFA1	moderate adverse	n/a
Stanhope Street	CFA1	major adverse	moderate adverse
Tavistock Place	CFA1	n/a	major adverse
Torrington Place	CFA1	major adverse	major adverse
Upper Wimpole Street	CFA1	n/a	major adverse
Wells Street	CFA1	n/a	major adverse

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Road name	CFA	2041	
		AM	PM
Wimpole Street	CFA1	n/a	major adverse

Table 44: Roads with increased traffic flow resulting in increased traffic-related severance, 2041 (outside CFA1)

Road name	CFA	2041	
		AM	PM
A201 King's Cross Road/Farringdon Road	CFA2	moderate adverse	moderate adverse
A503 Bayham Street	CFA2	major adverse	moderate adverse
A503 Camden Road	CFA2	major adverse	moderate adverse
A503 Delancey Street	CFA2	major adverse	major adverse
A503 Pratt Street	CFA2	major adverse	moderate adverse
A5200 York Way	CFA2	major adverse	major adverse
Pratt Street	CFA2	n/a	moderate adverse
Abercorn Place	CFA3	n/a	moderate adverse
Albert Terrace	CFA3	n/a	moderate adverse
B413 Clifton Gardens/Formosa Street/Shirland Road/Warwick Avenue	CFA4	n/a	major adverse
Elgin Avenue	CFA4	n/a	moderate adverse
Sutherland Avenue	CFA4	n/a	moderate adverse

15.6.34 The reconfiguration of roads around Euston station with the revised scheme, including the permanent closure of some roads, is also forecast to result in significant decreases in peak traffic flow, (more than 10% for all vehicles) that will in turn cause a significant reduction in traffic-related severance resulting from these decreased flows. The locations of these roads in CFA1 are shown in Table 45. The locations of these roads outside CFA1 are shown in Table 46.

Table 45: Roads with decreased traffic flow resulting in reduced traffic-related severance, 2041 (CFA1)

Road name	CFA	2041	
		AM	PM
A400 Bloomsbury Street (btw Great Russell St/Shafesbury Ave)	CFA1	moderate beneficial	moderate beneficial

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Road name	CFA	2041	
		AM	PM
A400 Camden Street (btw Pratt St/Crowndale Rd)	CFA1	moderate beneficial	moderate beneficial
A401 Shaftesbury Avenue (btw Windmill St/Dean St, and Monmouth St/Bloomsbury St)	CFA1	n/a	moderate beneficial
A4200 Russell Square	CFA1	major beneficial	n/a
A4200 Woburn Place – Russell Square	CFA1	n/a	moderate beneficial
A4201 Park Crescent	CFA1	moderate beneficial	n/a
B502 Guilford Street	CFA1	moderate beneficial	moderate beneficial
B506 Great Portland Street (north of New Cavendish St)	CFA1	moderate beneficial	n/a
Bedford Way	CFA1	moderate beneficial	moderate beneficial
Bloomsbury Square	CFA1	n/a	moderate beneficial
Cobourg Street	CFA1	moderate beneficial	n/a
Devonshire Street	CFA1	n/a	moderate beneficial
Drummond Street (West of North Gower Street)	CFA1	n/a	moderate beneficial
Drummond Street (East of North Gower Street)	CFA1	n/a	moderate beneficial
Endsleigh Street	CFA1	moderate beneficial	moderate beneficial
Euston Street (West of Cobourg Street)	CFA1	moderate beneficial	moderate beneficial
Euston Street (East of Cobourg Street)	CFA1	moderate beneficial	moderate beneficial
Gordon Street – Gordon Square	CFA1	major beneficial	major beneficial
Endsleigh Gardens	CFA1	moderate beneficial	n/a
Granby Terrace	CFA1	moderate beneficial	n/a
Great Russell Street	CFA1	n/a	major beneficial
Marchmont Street	CFA1	n/a	moderate beneficial
Montague Street	CFA1	n/a	moderate beneficial
North Gower Street	CFA1	n/a	moderate beneficial

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Road name	CFA	2041	
		AM	PM
Robert Street	CFA1	moderate beneficial	n/a
Russell Square	CFA1	moderate beneficial	n/a
Sidmouth Street	CFA1	moderate beneficial	n/a
Tavistock Place	CFA1	major beneficial	n/a
Tavistock Square	CFA1	major beneficial	major beneficial
University Street	CFA1	n/a	moderate beneficial
Upper Montagu Street	CFA1	moderate beneficial	n/a
Varndell Street	CFA1	n/a	moderate beneficial
York Street	CFA1	moderate beneficial	n/a

Table 46: Roads with decreased traffic flow resulting in reduced traffic-related severance, 2041 (outside CFA1)

Road name	CFA	2041	
		AM	PM
A5202 St. Pancras Way	CFA2	moderate beneficial	moderate beneficial

Parking and loading

- 15.6.35 There will be no further permanent loss of on-street, off-street or public parking spaces during the operation of the revised scheme over and above that reported for the completion of construction Stage A and the commencement of operation of HS2 Phase One at the end of 2026 (see Section 15.5). The temporary effects on parking resulting from construction Stage B1 will be removed.

Accidents and safety

- 15.6.36 Increased flows on major roads and through certain junctions can bring a potential increase in accident risk. In 2041 during operation of the revised scheme there are some links/junctions where there will be significant effects on potential accident risk, as a result of the expected changes in daily traffic flows:

- the junction of A400 Hampstead Road/Drummond Street (minor adverse significant effect); and
- the junction of A400 Hampstead Road/Cardington Street (minor adverse significant effect).

- 15.6.37 At these locations, the A400 Hampstead Road has provision for safe crossing facilities at junctions and signalised pedestrian crossings, which will help to mitigate these minor adverse significant effects.

Buses

- 15.6.38 The revised scheme will provide an improved linear bus station at the south of the station, in addition to additional bus stands accessed from A4200 Eversholt Street north of the conventional station. The remodelled bus station, at 200m long, will be approximately twice the length of the existing bus station. The combination of the northern bus standing area and the remodelled bus station will provide flexibility in bus routing and opportunities to reduce wasted bus mileage.
- 15.6.39 The remodelled and expanded bus station results in a moderate beneficial significant effect.
- 15.6.40 The 'south to east' bus route 91 currently bypasses the bus station when travelling from east to south. The revised scheme will enable the 91 bus to stop at the bus station from both directions. Bus route 59 will continue to serve the bus station in both directions. Both bus routes 59 and 91 will turn right from A501 Euston Road into the bus station when travelling from south to east. Bus route 253 will also be diverted to leave the bus station via A501 Euston Road, Churchway and Grafton Place.
- 15.6.41 The additional delay at certain junctions close to the conventional and high speed Euston stations, such as Euston Circus, will result in the following significant effects:
- route 10 (eastbound) – moderate adverse significant effect in the AM peak hour;
 - route 24 (northbound) – moderate adverse significant effect in the AM peak hour;
 - route 29 (northbound) – moderate adverse significant effect in the AM peak hour;
 - route 134 (northbound) – moderate adverse significant effect in the AM peak hour; and
 - route C19 (westbound) – minor adverse significant effect in the AM peak.
- 15.6.42 There will be no other significant effects on bus delays within this area.

Pedestrians

- 15.6.43 The revised scheme includes substantial improvements for pedestrians, including:
- expanded public space at the southern entrances to the conventional and high speed stations, which will eliminate level changes and improve step-free access;
 - improved linear bus station that will be more permeable to pedestrian movement;
 - improved crossings of A501 Euston Road with a new pedestrian phase at the junction with the bus station;
 - the permanent subway linking Euston underground station to Euston Square underground station, which opened at the end of construction Stage A will continue to operate. This will reduce demand on busy footways and will

include lifts that will provide step-free access (the effect is the same as reported for Stage A);

- the permanent subway linking Euston underground station to Gordon Street, which opened at the end of construction Stage A, will continue to operate. This will reduce demand on busy crossings (the effect is the same as reported for Stage A);
- A400 Hampstead Road high speed station entrance will improve walking accessibility from the north and connections with A400 Hampstead Road bus services. This is a minor beneficial significant effect that arises as a result of the opening of the completed high speed station at the end of 2033;
- Cobourg Street high speed station entrance will improve walking accessibility from the north and connections with A400 Hampstead Road. This effect is the same as reported for the end of construction Stage A; and
- improved pedestrian and cycle crossings of A400 Hampstead Road.

15.6.44 Four paths are affected by the revised scheme:

- the path between A400 Hampstead Road leading into St. James's Gardens will be permanently closed replaced by a new area of public realm at the northern station entrance. Alternative routes to access the station are provided via a new area of public realm at the northern station entrance;
- the pedestrian section of Harrington Street was permanently closed at the completion of construction Stage A and replaced by a new area of public open space. This path is associated with buildings that will be demolished as a result of the revised scheme; and
- two paths across Euston Square Gardens, (one to the east and one to the west) will be permanently closed and then reprovided as new routes of equivalent status.

15.6.45 The effects on these paths are not significant.

Cycling

15.6.46 Predictions of cycle use to and from the conventional and high speed stations are based on the current profile of cycling destinations and a 7% target modal share for both baseline and the revised scheme. When compared to the 2041 future baseline cycle flows to and from Euston station are expected to increase following the opening of HS2 Phase Two. In the AM peak hour the flows are predicted to increase by about 303 (53%) to the station and about 561 (38%) from the station, and the PM peak hour cycle flows are predicted to increase by about 681 (31%) to the station and about 184 (54%) from the station.

15.6.47 Increased demand for cycle parking at the conventional and high speed stations will be met by providing more cycle parking facilities in the overall high speed station design. The conventional station currently provides 310 spaces and this will be increased to some 2,000 spaces with the revised scheme across both the high speed and conventional stations. The cycle parking spaces provided by the revised scheme

are a substantial uplift above existing facilities that provides for growth in cycling. Specific cycle parking locations will be proposed in collaboration with TfL and LBC. A phased approach to cycle parking capacity is proposed. This will provide capacity to accommodate both demand generated by the revised scheme and baseline demand. This is a major beneficial significant effect. It is expected that 200 cycle hire docking stations will be provided, dispersed in streets around the station.

- 15.6.48 All existing cycle routes will be reinstated with the exception of the Melton Street and Cardington Street section of LCN Route 6a. The stations at Euston will also be served by two new cycle routes which connect to the open public spaces at the Cobourg Street and A400 Hampstead Road high speed station entrances, with the latter route passing the station's main cycle parking area located off Cobourg Street.
- 15.6.49 The first route comprises a north to south 'quietway' cycle route linking Mornington Crescent to Tavistock Place/Gordon Square, which replaces unofficial LCN Route 6a. This route consists of shared bus and cycle lanes or protected cycle lanes on A400 Hampstead Road leading to a segregated cycle track in the public space at the Cobourg Street station entrance, passing a new cycle parking area, a segregated, on carriageway, two-way cycleway along Cobourg Street before entering a shared pedestrian/cycle route in the public space to the south west of high speed station connecting to Gordon Street to the south.
- 15.6.50 The second new cycle route, comprises a new east-west 'quietway' cycle route linking Regent's Park to the new open space and cycle parking to the north of the high speed station. It includes a shared pedestrian/cycle ramp at the east end of Varndell Street (which will be closed to motor vehicles), pelican crossing(s) across A400 Hampstead Road and a new two-way cycle track leading to the proposed open space and cycle parking at the Cobourg Street station entrance.

Cumulative effects

- 15.6.51 The assessment includes for the cumulative effects of planned development during operation.
- 15.6.52 The assessment also includes for in-combination effects by taking into account transport impacts as a result of the revised scheme in neighbouring CFA areas. There are no effects from adjacent CFAs.

Other mitigation measures

- 15.6.53 Changes in traffic flows will lead to an increase in delays to vehicle occupants at a number of junctions in 2041. However, most signalised junctions in central London are under adaptive control which will optimise the signal stages in real time. This means that many of those junctions with a minor significant effect will be mitigated through adaptive control, although this is most effective where there is minimal net increase in traffic through the junction.
- 15.6.54 It should be noted that in most locations where increased traffic flows result in increases in traffic-related severance, there are dedicated crossing facilities which will mitigate or remove these effects.
- 15.6.55 Additional delays to bus routes have been identified as a result of the revised scheme on five bus routes. With changes to the signal times through adaptive control it would

be possible to reduce the additional delay and potentially remove these significant effects.

- 15.6.56 A review of pedestrian crossing timings could facilitate improved area connectivity and permeability in collaboration with LBC and TfL.
- 15.6.57 The travel plan for the high speed station implemented with the introduction of Phase One HS2 services will continue to be used to promote improved access and minimise use of motorised modes.

Summary of likely residual significant effects

- 15.6.58 There will be beneficial effects of the revised scheme as a result of improved journey times on the high speed railway to the Midlands and beyond; lower crowding levels on trains to and from the conventional station as a result of increases in train frequencies; and released capacity on other rail services easing pressure on the WCML with resultant reliability benefits.
- 15.6.59 The revised scheme will provide benefits at stations and interchanges associated with the transfer to Euston station of passengers who previously would have arrived at King's Cross and St. Pancras International from the north of England resulting in some relief to these stations. There will be improvements in accessibility and reduced crowding levels in the new high speed station concourses; increased passenger area and improved platform access as a result of improvements to Euston underground station and the provision of new escalators; introduction of step-free access throughout the high speed station and Euston underground stations; improved facilities and access to Euston Square underground station as a result of the provision of a new underground station entrance at Gordon Street and subway connection; and increasing capacity for bus routes as a result of the improved linear bus station and additional bus stands off A4200 Eversholt Street.
- 15.6.60 The revised scheme will lead to public transport delays due to bus route changes and diversions, as well as some additional bus delays, on the following bus routes: route 10 (eastbound), route 24 (northbound), route 29 (northbound), route 134 (northbound), route C19 (westbound). These effects can be mitigated through changes to signal control as part of adaptive control measures.
- 15.6.61 Additional demand on the LU network in 2041 will lead to some increased crowding and consequential delay on LU on the Circle, Hammersmith & City and Metropolitan lines at Euston Square underground station.
- 15.6.62 Changes in traffic flows will result from permanent road closures, changes to the local road network and relocated and increased taxi operations. Increases in traffic flows will mainly be concentrated on some roads to the east of conventional station in the Somers Town and King's Cross area between A4200 Eversholt Street and A5203 York Way, to the immediate west of the high speed station, including A400 Hampstead Road and the permanent taxi pick-up and set-down facility, as well as in the Regent's Park and Camden Town areas. In addition, there will be increases in traffic on some roads to the south of the A501 Euston Road, particularly A400 Gower Street, B504 Judd Street, A5200 Gray's Inn Road and A201 Farringdon Road.
- 15.6.63 Reductions in traffic flows will result in improvements for pedestrians crossing some roads. The diversion impacts of road closures result in decreases in traffic which will

mainly be concentrated on some roads to the south of A501 Euston Road between Gordon Street and A4200 Upper Woburn Place, in the Bloomsbury area, and in the Camden Town area between A400 Camden Street and A5202 St. Pancras Way.

- 15.6.64 Effects arising from the revised scheme on parking and loading bays are expected to be the same as those reported for Stage A.
- 15.6.65 The revised scheme includes increased cycle parking capacity and improvements to cycle and walking routes on roads surrounding the station which lead to reductions in delay and improvements to amenity and ambience.
- 15.6.66 Minor significant effects on potential for accidents and safety risks have been identified at the junction of A400 Hampstead Road and Drummond Street and the junction of A400 Hampstead Road and Cardington Street.
- 15.6.67 The significant effects that result from operation of the revised scheme in 2026 (Phase One services) and with HS2 Phase Two services in 2041 are shown on Map Series TR-04-001 (SES2 and AP3 Volume 5, Traffic and transport, CFA1 Map Book).

16 Water resources and flood risk assessment

16.1 Introduction

- 16.1.1 The revised scheme, which comprises a high speed station with subsurface platforms and ground level concourses, and the railway approach, is designed, in part, to meet the aspirations of the EAP. The key elements of the revised scheme which are relevant to this topic include deep piles for the high speed station foundations designed to also provide support to potential OSD. While preliminary design suggests piles could extend to -27m OD, the detailed design may require piles which extend further. Therefore, a worst case has been assumed that piles and the underground parts of the station may extend down to -40m OD into the Chalk underlying the high speed station.
- 16.1.2 The revised scheme will include a basement beneath the high speed platforms (which are 4m lower than the conventional platforms) which will be constructed to provide servicing and logistics for the high speed station and trains.
- 16.1.3 The provision of platforms for high speed trains at Euston will require widening of the existing railway retained cutting, located to the north of the conventional station. The high speed railway will enter tunnel at the Euston portal about 100m south of Parkway. The high speed tracks will enter the proposed twin bore tunnel at a deeper level than the existing railway. This will require the reconstruction of retaining walls on the western side of the existing cutting.
- 16.1.4 In addition, improvements will be made to Euston underground station. An additional ticket hall will be constructed at a lower level than the existing ticket hall with connections to the high speed platforms via the LU circulation area.
- 16.1.5 This section provides a description of the current baseline for water resources including surface water, groundwater and the baseline conditions for flood risk. It then

reports on the likely impacts and significant effects on these aspects as a result of the construction and operation of the revised scheme.

- 16.1.6 The main environmental features of relevance to water resources and flood risk include:
- Grand Union Canal (The Regent's Canal) – the section of canal in the Euston area is commonly known as the Regent's Canal;
 - the Chalk Principal aquifer; and
 - three Secondary A aquifers.
- 16.1.7 Key environmental issues relating to water resources and flood risk include:
- the potential impacts to surface water quality;
 - the potential impacts to the quality of shallow and deep groundwater; and
 - potential impacts to surface water and sewer flood risks from works at Euston station.
- 16.1.8 Volume 5 Appendix WR-001-000 of the main ES contains a report on the route-wide effects including:
- generic assessments on a route-wide basis;
 - stakeholder engagement;
 - in combination effects;
 - a draft operation and maintenance plan for water resources and flood risk;
 - a Water Framework Directive¹⁶³ (WFD) compliance assessment; and
 - a route-wide FRA.
- 16.1.9 Detailed reports on water resources and flood risk within this area are also contained in the Volume 5 appendices. These include:
- SES2 and AP3 ES Appendix WR-002-001: Water Resources Assessment report; and
 - SES2 and AP3 ES Appendix WR-003-001: FRA.
- 16.1.10 Map Series WR-01 shows some of the details, environmental baseline and design features referred to in this report and are all contained in the SES2 and AP3 ES Volume 5, Water Resources and Flood Risk Assessment Map Book.
- 16.1.11 Discussions were held with the Environment Agency and Thames Water Utilities Ltd (in relation to the presence of public water supply boreholes) during preparation of the main ES.

¹⁶³ Water Framework Directive – Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Strasbourg, European Parliament and European Council.

16.2 Scope, assumptions and limitations

- 16.2.1 The assessment scope, key assumptions and limitations for the water resources and FRA are set out in Volume 1 of the main ES and in the SMR Addendum presented in Volume 5: Appendix CT-001-000/1 and Appendix CT-001-000/2 of the main ES. This report follows the standard assessment methodology.
- 16.2.2 The spatial scope of the assessment was based upon the identification of surface water and groundwater features within 1km of the route centreline of the revised scheme, except where there is clearly no hydraulic connectivity. For surface water features in urban areas, the extent was reduced to 500m. Outside these distances it is unlikely that direct impacts upon the water environment will be attributable to the revised scheme. Where works extend more than 200m from the centre line, for example at stations and depots, professional judgment has been used in selecting the appropriate limit to the extension of spatial scope required. This spatial scope is described as the study area.
- 16.2.3 WFD classification data has been made available by the Environment Agency. For surface water bodies that do not have a WFD status class shown in the RBMP, the status class has been taken as the status class for the first downstream water body for which a status class is reported. Where groundwater does not have a WFD status class shown in the relevant RBMP, these are referred to as 'not assessed by the Environment Agency'.
- 16.2.4 Limited data are available with regard to water quality and no additional surveys were carried out for this assessment.
- 16.2.5 A reasonable understanding of conditions likely to be encountered in below ground construction is available from existing sources documenting the geology and hydrogeology of the study area and groundwater level data from the Environment Agency. No monitoring of groundwater levels was undertaken as part of this assessment.
- 16.2.6 Two-dimensional surface water hydraulic modelling has been undertaken as part of the design of the high speed station at Euston. The limitations associated with flood risk within this study area are described in detail in the FRA in Volume 5: SES2 and AP3 ES Appendix WR-003-001.

16.3 Environmental baseline

Existing baseline – surface water resources

Surface water features

- 16.3.1 The route does not cross any watercourses within the area, which is located within the Thames RBD and is covered by the RBMP¹⁶⁴.

¹⁶⁴ Environment Agency River Basin Management Plan, Thames River Basin District, December 2009.

- 16.3.2 Although more than 500m from the route, the revised scheme includes utility works in the vicinity of the Regent's Canal in the section of the canal below Kentish Town Lock at Camden (WFD water body "Regent's Canal lower section")¹⁶⁵.
- 16.3.3 The canal is currently used for navigation by both commercial and leisure users.
- 16.3.4 Surface run-off currently drains into the Thames Water Utilities Ltd combined sewer network. The water quality of run-off can be expected to reflect the urban nature of the Euston area. Run-off may therefore be contaminated to varying levels with sediment, oil and other contaminants associated with urban catchments.
- 16.3.5 The current surface water baseline is shown on Map WR-01-001 (SES2 and AP3 ES Volume 5, Water Resources and Flood Risk Assessment Map Book) and all surface water features within the study area are assessed within Volume 5: SES2 and AP3 ES Appendix WR-002-001. Table 47 includes features potentially affected by the revised scheme.

Table 47: Surface water features potentially affected by the revised scheme

Water feature	Location description (SES2 and AP 3 Volume 5, Water Resources Map Book map reference)	Watercourse classification ¹⁶⁶	WFD water body and current overall status	WFD status objective (by 2027 as in RBMP)	Receptor value ¹⁶⁷
Grand Union Canal (Regent's Canal)	The Regent's Canal is located north of Regent's Park and close to the boundary of this study area. See Map WR-01-001, F5.	Artificial	Regent's Canal, lower section. (GB70610510) Moderate	Good potential	High

Water Framework Directive status

- 16.3.6 The WFD status classification provided by the Environment Agency is indicated in Table 47.

Abstractions and permitted discharges

- 16.3.7 There are no licensed surface water abstractions within 500m of the route in the study area. There is the potential for further unlicensed abstractions to exist, as a licence is not required for abstraction volumes below 20m³ per day.
- 16.3.8 There are no current consented surface water discharges within 500m of the route in the study area.

¹⁶⁵ The Environment Agency's Detailed Rivers Network (DRN) indicates a culverted watercourse at a minimum distance of 500m east of the route at Euston. The reach has been included in the DRN to ensure connectivity between Highgate Ponds and the Thames within the DRN. It is shown on map WR-01-001 as an underground river. However it is considered that the watercourse is a part of the sewer network and is not a surface water feature. It has therefore not been included in this assessment.

¹⁶⁶ 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.

¹⁶⁷ For examples of receptor value see Table 43 in the SMR addendum (Volume 5: Appendix CT-001-000/2 of the main ES).

Existing baseline – groundwater resources

Geology and hydrogeology

- 16.3.9 The location of private abstractions and geological formations are shown on Map WR-02-01 (Main ES Appendix WR-002-001).
- 16.3.10 The geological formations within the Euston area are described further in Section 11 of this report and are shown in a schematic geological cross-section in Map WR-02-001 (Main ES: Volume 5, Water Resources and Flood Risk Assessment Map Book).
- 16.3.11 A summary of the superficial and bedrock geology and hydrogeology is presented in Table 48. Unless otherwise stated, the geological groups listed are all crossed by the route.

Table 48: Summary of geology and hydrogeology in CFA1

Geology	Distribution	Formation description	Aquifer classification	WFD water body and current overall status	Predicted WFD status objective (by 2027 as in RBMP)	Receptor value
Superficial deposits						
Thames Catchment Subgroup (Maidenhead Formation, Langley Silt Member)	Outcrops in a thin band on the northern margin of the Lynch Hill Gravel Formation in the southern part of the study area.	Clay and silt	Unproductive strata	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Thames Catchment Subgroup (Maidenhead Formation, Lynch Hill Gravel Member)	Outcrops across the southern part of the study area underneath the south western edge of the proposed high speed station footprint.	Sand and gravel	Secondary A aquifer	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Bedrock						
Thames Group (comprising the London Clay Formation. The Harwich Formation)	Across entire study area.	Stiff grey clay, sandy or silty in some horizons	Unproductive	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Geology	Distribution	Formation description	Aquifer classification	WFD water body and current overall status	Predicted WFD status objective (by 2027 as in RBMP)	Receptor value
may also be present at the base)						
Lambeth Group (Upnor, Reading and Woolwich Formations)	Assumed to underlie London Clay. Formation throughout the study area.	Lenses and interbedded layers of clay, silty sand and shelly silty clay at the top, sand and gravel towards the base	Unproductive (top) / Secondary A (base)	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low (top) Moderate (base)
Thanet Sand Formation	Assumed to underlie the Lambeth Group throughout the study area.	Greenish and brownish grey, silty, fine-grained sand	Secondary A	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
White Chalk Subgroup	Assumed to underlie Thanet Sand Formation throughout the study area.	Firm white chalk with marl seams and flint bands	Principal	Mid Chilterns Chalk (GB40601G601200) Poor	Good	High

Superficial deposits

- 16.3.12 Superficial deposits comprising the Langley Silt Member and the Lynch Hill Gravel Member of the Maidenhead Formation are present in the southern part of the study area.
- 16.3.13 The Lynch Hill Gravel Member is classified as a Secondary A aquifer, but is of low value due to its limited extent and potentially poor water quality. The Langley Silt Member is classified as unproductive strata.

Bedrock aquifers

- 16.3.14 The London Clay Formation underlies the whole of the study area. It is a blue-grey clay that weathers to a brown colour in its upper part. The geological succession beneath the London Clay Formation comprises, in turn:
- the Harwich Formation, a thin sandy deposit which may be present in some locations;
 - the Lambeth Group (also termed the Woolwich and Reading Formations)

which comprises mixed sands and clays, and pebble deposits in some locations;

- the Thanet Sand Formation, a dense greenish or brownish grey sand; and
- the Cretaceous Chalk Group, a succession of soft white limestone units.

16.3.15 The geological formations within this study area are described in Section 11, Land quality and further details are included in Volume 5: SES2 and AP3 ES Appendix WR-002-001.

Water Framework Directive status

16.3.16 No WFD classification has been given by the Environment Agency to the superficial deposits.

16.3.17 The London Clay Formation is classified by the Environment Agency as unproductive strata.

16.3.18 The Lambeth Group and Thanet Sand Formation are not assessed by the Environment Agency. However, these may be in hydraulic continuity with the underlying Chalk aquifer, which is classified as being part of the Mid-Chilterns Chalk groundwater body, a Principal aquifer.

Abstractions and permitted discharges

16.3.19 The Environment Agency reports that there are five private licensed groundwater abstractions from the underlying Chalk within the study area. Details are presented in Volume 5: SES2 and AP3 ES Appendix WR-002-001. The abstractions are classified as high value receptors. No unlicensed groundwater abstractions have been identified from the data available. There is the potential for unlicensed abstractions to exist, as a licence is not required for abstraction volumes below 20m³ per day.

16.3.20 The Environment Agency reports that there is a PWS with a SPZ in this study area, approximately 840m west of the route (refer to Map WR-02-001, Main ES: Volume 5, Water Resources and Flood Risk Assessment Map Book for the location of the SPZ). The SPZ does not intrude into the study area, and is located in the adjacent Primrose Hill to Kilburn study area (CFA 3).

16.3.21 The Environment Agency records show that there are five current consented discharges to groundwater within 1km of the route as set out in Volume 5, SES2 and AP3 ES Appendix WR-002-001.

Surface water/groundwater interaction

16.3.22 There are no significant groundwater/surface water interactions within 1km of the route in the study area.

Water dependent habitats

16.3.23 No water dependent habitats have been identified in the study area.

Existing baseline – flood risk

River flooding

- 16.3.24 The agreed data set for river flooding is the Environment Agency Flood Zone Mapping.
- 16.3.25 The revised scheme will not cross over any Environment Agency designated Main river or Ordinary watercourses within this study area according to the DRN as shown in Map WR-01-001 (SES2 and AP3ES: Volume 5, Water Resources and Flood Risk Assessment Map Book). The entire study area is within Flood Zone 1.

Surface water flooding

- 16.3.26 The locally agreed surface water flooding dataset is from the modelling activities undertaken as part of the Drain London project for the production of the LBC Preliminary Flood Risk Assessment¹⁶⁸ (PFRA) and the LBC Surface Water Management Plan¹⁶⁹. The Environment Agency Flood Map for Surface Water (uFMfSW) was updated in November 2013 to incorporate Drain London mapping with previously completed Environment Agency mapping, and has therefore been used to inform the assessment as the most up-to-date information. The uFMfSW is shown in Map WR-01-001 (SES2 and AP3ES: Volume 5, Water Resources and Flood Risk Assessment Map Book).
- 16.3.27 The North London Strategic Flood Risk Assessment¹⁷⁰ (SFRA) reports that a large area in the north of LBC was affected by surface water flooding in 1975 and again in August 2002 as a result of heavy rainfall inundating the public sewer system. A retaining wall collapsed onto the railway in the approach to Euston station during this flooding event and caused a closure of the station¹⁷¹.
- 16.3.28 There are parts of the study area that have a high risk of surface water flooding during rainfall events up to and including the 1 in 1000 year return period (0.1% annual probability) event. The existing railway, immediately to the north of Euston station, is predicted to flood at a 1 in 30 years return period (3.3% annual probability) and to depths of over 900mm during the 1 in 1000 year return period rainfall event. The roads surrounding the station infrastructure are also shown to be at risk of localised surface water flooding. More detailed information on the risk of surface water flooding can be found in the Flood Risk Assessment in Volume 5: SES2 and AP3 ES Appendix WR-003-001.

Sewer flooding

- 16.3.29 The agreed datasets for sewer flooding are TWUL records in the LBC PFRA and the North London SFRA.
- 16.3.30 The TWUL historical sewer flooding records show that there have been a number of sewer flooding incidents in the study area. The LBC PFRA states that sewer flooding

¹⁶⁸ Halcrow (2011), London Borough of Camden Preliminary Flood Risk Assessment.

¹⁶⁹ Halcrow (2013) Surface Water Management Plan, London Borough of Camden.

¹⁷⁰ Mouchel (2008), North London Strategic Flood Risk Assessment.

¹⁷¹ London Borough of Camden (2003), Floods in Camden: Report of the Floods *Scrutiny Panel*.

occurred within LBC in August 2004, September 2005 and July 2007. Specific locations of these flood incidents are not given.

Artificial water bodies

- 16.3.31 Flooding from artificial water bodies, such as canals and reservoirs, may occur as a result of failure of a retaining structure that impounds water. The agreed dataset for flooding due to reservoir failure is the Environment Agency Reservoir Inundation Map, as shown in Map WR-01-001 (SES2 and AP3ES: Volume 5, Water Resources and Flood Risk Assessment Map Book).
- 16.3.32 There are no reservoir flood extents on the Environment Agency Reservoir Inundation Map within the study area.
- 16.3.33 The Grand Union Canal (The Regent's Canal) lies within the study area to the north of Regent's Park. There are no raised sections of canal in this study area and hence there is no risk of inundation from failure. The crossing of the canal (SWC-CFA3-01 as shown in Map WR-01-003, SES2 and AP3ES: Volume 5, Water Resources and Flood Risk Assessment Map Book) will be located within the Primrose Hill to Kilburn (Camden) area (CFA3), as shown in Map WR-01-003 (SES2 and AP3ES: Volume 5, Water Resources and Flood Risk Assessment Map Book), and is therefore not considered further in this section.

Groundwater flooding

- 16.3.34 The agreed dataset for groundwater flooding is the LBC PFRA. Where this dataset does not include sufficient information on the risk of flooding from groundwater the BGS maps showing the susceptibility to groundwater flooding have been reviewed.
- 16.3.35 There are no historical incidents of groundwater flooding within the study area. The LBC PFRA identifies an area to the south-west of Euston station with an increased potential for elevated groundwater. BGS geological mapping shows there are superficial deposits of Lynch Hill Gravel in this area.

Future baseline

Construction (2017-2026)

- 16.3.36 SES2 and AP3 ES Volume 5 Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans which are assumed to have been implemented by 2017. None of the identified developments affect the assessment of the revised scheme's likely construction impacts on water resources.

Construction and operation (2026-2033)

- 16.3.37 No committed developments have been identified in this area that will materially alter the baseline conditions in 2026.

Operation (2033 onwards)

- 16.3.38 No committed developments have been identified in this area that will materially alter the baseline conditions in 2033.

Climate change

- 16.3.39 Current projections to the 2080s indicate that climate change may affect the future baseline against which the impacts of the 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, except for flood flows described below, these changes are not considered to result in the reported effects from the revised scheme changing in significance.
- 16.3.40 Current projections indicate that there will be more frequent, higher intensity rainfall events in the future. The probability and severity of surface water flooding could therefore increase as surface water drainage systems fail to cope with more frequent, higher intensity storms. Peak river flows during flood events are expected to increase, potentially causing greater depths and extents of flooding.
- 16.3.41 When considering the influence that climate change may have on the future baseline, against which impacts from the revised scheme on flood risk have been evaluated, the assessment has used the recommended precautionary sensitivity ranges of rainfall intensities, as given in the Environment Agency Climate change allowance for planners¹⁷². The sensitivity testing undertaken allows for variations in climate change factors included in other national guidance.
- 16.3.42 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.

16.4 Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 16.4.1 The general approach to mitigation is set out in Volume 1, Section 9 of the main ES.
- 16.4.2 The following examples illustrate how avoidance and mitigation measures will, in many cases, reduce potentially significant adverse effects on water resources and flood risk to levels that will not be significant. Further details are given in Volume 5: SES2 and AP3 ES Appendix WR-002-001 and WR-003-001.
- 16.4.3 Drainage from the high speed station, including the development plot decks, the high speed railway cutting and dive unders, north of the station, and associated infrastructure will be discharged, under agreement to TWUL sewers, and so avoid permanent impacts on surface water features in this area. Attenuation storage will be provided to restrict run-off rates to 50% of the calculated existing rate for the development area.
- 16.4.4 The tunnelling methodology will be selected to avoid significant groundwater ingress into the tunnels. As the tunnel in this study area is mainly in London Clay there is no anticipated requirement to control and remove significant quantities of groundwater (dewatering). However, if dewatering is required, it will be done in consultation with the Environment Agency.

¹⁷² Environment Agency (September 2013), Climate change allowances for planners.

- 16.4.5 The retaining wall construction is likely to penetrate the superficial Lynch Hill Gravel deposits, on the southern edge of the high speed station. These walls have the potential to increase the risk of groundwater flooding outside of the construction area within the superficial deposits. The potential risk of groundwater flooding will be reviewed as the design of the station progresses and, if necessary, mitigation in the form of drainage will be installed around the proposed retaining walls.
- 16.4.6 The draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000) sets out the measures and standards of work that will be applied to the construction of the revised scheme. It will provide effective management and control of the impacts during the construction period.
- 16.4.7 Implementation of the measures defined in Section 16 of the draft CoCP, including detailed method statements will ensure that there will be no impacts on surface water quality or flows associated with construction such as the utility works near the Regent's Canal. Any piled foundations that pass into the Lambeth Group, Thanet Sand Formation and Chalk are unlikely to affect groundwater quality significantly. Application of the measures set out in the draft CoCP, will ensure groundwater quality is not adversely affected by ensuring appropriate pollution control mechanisms will be in place during construction of the piled retaining walls and foundations. Appropriate guidance will be adhered to, including the Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention¹⁷³. Groundwater and surface water monitoring plans will be prepared, where piling could affect below ground contamination. The contractor will be required to consult with the Environment Agency regarding the response procedures to be implemented in the event of works affecting groundwater levels or quality.
- 16.4.8 Section 16 of the draft CoCP requires contractors to obtain the necessary consents from TWUL to enable discharge of surface water run-off to the public sewer network from construction compounds, such as at Euston station, preventing an increase in the risk of sewer flooding.
- 16.4.9 Euston station is located within an area at risk of surface water flooding. As stated in Section 16 of the draft CoCP, such areas will have site specific flood risk management plans prepared prior to construction.
- 16.4.10 A flood wall will be constructed between the high speed railway and the existing railway, in the high speed station and the approach, to ensure that surface water will be kept separate, and to reduce the risk of flooding to the revised scheme. Parapet walls, a minimum of 1.8m high, will be constructed at the boundaries of the high speed railway cutting and over bridges. Surface water flooding in the area surrounding the conventional station is formed of isolated areas of ponding in topographic low points that have no connectivity. Rain falling on these areas within the development boundary will be collected into the proposed site drainage and there will be no deflection of overland flow caused by the revised scheme outside the station. Preliminary modelling undertaken as part of the station design indicates that there will be no increase in the off-site risk of flooding from surface water as a result of the revised scheme.

¹⁷³ Environment Agency (2001), Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution.

Assessment of impacts and effects

- 16.4.11 This section describes the significant effects following the implementation of avoidance and mitigation measures.
- 16.4.12 Details of the potential impacts that will not have significant effects are provided in the Water Resources Assessment report in SES2 and AP3 ES Volume 5: Appendix WR-002-001 and Flood Risk Assessment in SES2 and AP3 ES Volume 5: Appendix WR-003-001.
- 16.4.13 An assessment of the impact on the WFD status is detailed within the WFD Compliance Assessment, contained within the route-wide Water Resources appendix (Volume 5: Appendix WR-001-001 of the main ES).
- 16.4.14 It is not considered that projected climate change effects, combined with the effects from the construction of the revised scheme, will alter the significance of any of the reported effects on surface water, groundwater or water dependant habitats. Further information is contained in Volume 3: Route-wide Effects Assessment in the main ES.

Temporary effects

Surface water

- 16.4.15 The assessment shows that there will be no significant temporary adverse effects on surface water resources during the construction period.

Groundwater

- 16.4.16 Piling for the construction of new LU infrastructure and the high speed station retaining walls and basement could have the potential to adversely impact on groundwater quality due to the creation of pathways from the overlying strata through the London Clay, or as a result of the introduction of contaminants into the aquifer. Potential contaminants include concrete, cement grouts and associated additives and drilling fluids. This has been assessed to potentially have a moderate impact, with moderate effect, and therefore is significant. The use of appropriate piling methods will avoid creating hydraulic pathways, such as cracks and cavities between the construction feature and the natural rock. Application of the guidance on protection of aquifers (EA, 2001) and the mitigation measures set out in the draft CoCP will control the materials used in the aquifer, leading to a negligible impact, with neutral effect and therefore is not significant.

Flood risk

- 16.4.17 The assessment shows that there will be no significant increase in risks resulting from all sources of flooding during the construction process and therefore no significant temporary adverse effects will occur.

Permanent effects

Surface water

- 16.4.18 No significant adverse effects to surface water resources have been identified during the assessment.

Groundwater

- 16.4.19 Piling during construction could have the potential to impact on groundwater flow in the Chalk aquifer. This may in turn impact on the groundwater abstraction GW92. Although GW92 is located up gradient of the revised scheme, construction of piles will take place inside the outer protection zone¹⁷⁴ of this source. Groundwater flow will be constricted between the piles potentially creating a localised increase in piezometric levels up gradient of the piles and a lowering of piezometric levels on the down gradient side of the piles. Assessment shows that the impact of these changes in piezometric levels is likely to be highly localised and therefore negligible.
- 16.4.20 Barrette walls along the western and southern side of the new high speed platforms will extend through the Lynch Hill gravel shallow aquifer and key into the underlying London Clay. This will impact on groundwater flow and quality in the Lynch Hill Gravel. These walls will only intersect a small section of the Lynch Hill Gravel and consequently construction will have a minor impact on groundwater flow and quality, leading to a neutral effect and is therefore not significant. Application of the guidance on protection of aquifers¹⁷⁵ and the mitigation measures set out in the draft CoCP will control the materials used in the aquifer, leading to a negligible impact, with a neutral effect which is not significant.
- 16.4.21 Compensation grouting may be used as settlement compensation beneath various buildings in the area. Construction within the Lambeth Group and the Thanet Sand Formation could result in the introduction of contaminants into the aquifer from support fluids, concrete and cement grouts, their associated additives, and fluids used in construction equipment. This grouting will take place in the shallow ground from within the building footprint and any impact on groundwater flow will be highly localised. Consequently it is assessed that this activity will have a minor impact on groundwater flow and quality, leading to a neutral effect which is not significant. Application of the guidance on protection of aquifers (EA, 2001) and the mitigation measures set out in the draft CoCP will control the materials used in the aquifer, leading to a negligible impact, with a neutral effect and therefore is not significant.

Flood risk

- 16.4.22 The assessment shows that there will be no significant increase in risks resulting from any sources of flooding during construction and therefore no significant permanent adverse effects will occur.

Other mitigation measures

- 16.4.23 There are considered to be no other mitigation measures required for water resources or flood risk.

Cumulative effects

- 16.4.24 There are no committed developments that have been identified which will result in significant cumulative effects.

¹⁷⁴ The inner protection zone of a private water abstraction is defined as the 50-day travel time from any point below the water table to the source with a minimum 50m-radius and is equivalent to a PWS SPZ1. The outer protection zone of a private water abstraction is defined by a 400-day travel time from a point below the water table and equivalent to SPZ2 at a PWS.

¹⁷⁵ EA, 2001 – Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention.

Summary of likely residual significant effects

- 16.4.25 Following mitigation, no significant residual adverse effects to water resources and flood risk have been identified during construction in Stage A.

16.5 Effects arising during Stage B1 construction and operation (2026–2033)

Avoidance and mitigation measures

- 16.5.1 The draft CoCP (see Volume 5 of the main ES: Appendix CT-003-000) sets out the measures and standards of work that will be applied to the construction of the revised scheme. It will provide effective management and control of the impacts during the construction period.
- 16.5.2 Piled foundations that pass into the Lambeth Group, Thanet Sand Formation and Chalk are unlikely to affect groundwater quality significantly. Application of the measures set out in the draft CoCP and other appropriate guidance will prevent significant adverse effects on groundwater quality by applying appropriate pollution control mechanisms during construction of the piled retaining walls and foundations. Groundwater monitoring plans will be prepared, where piling could come into contact with below ground contamination. The contractor will be required to consult with the Environment Agency regarding the response procedures that will be implemented in the event of works affecting groundwater levels or quality.
- 16.5.3 Generic examples of management measures during operation and management of the revised scheme that will mitigate impacts so that there are no significant adverse effects on the quality and flow characteristics of surface water courses and groundwater bodies are described in Volume 1 and in the draft operation and maintenance plan for water resources and flood risk included in Volume 5 Appendix WR-001-001 of the main ES.
- 16.5.4 Operation and management of the revised scheme is not likely to have a significant adverse effect on flood risk anywhere in the catchments through which it will pass. Generic examples of management measures that may mitigate flood risk are described in Volume 1 of the main ES.
- 16.5.5 Surface water run-off and drainage systems from permanent infrastructure will be in place prior to the commencement of construction Stage B1 and will be designed to attenuate run-off before being discharged to the TWUL sewer network as described in the previous section. This attenuation will also serve to reduce the risk of contaminated run-off entering TWUL sewers. Attenuation storage will be provided to restrict run-off rates to 50% of the calculated existing rate for the completed development area.

Assessment of impacts and effects

Temporary Impacts

Surface water

- 16.5.6 No significant adverse effects to surface water resources have been identified during the assessment of Stage B1 construction and operation.

Groundwater

- 16.5.7 Piling for the construction of new LU infrastructure and the high speed station basement could have the potential to adversely impact on groundwater quality due to the creation of pathways from the overlying strata through the London Clay, or as a result of the introduction of contaminants into the aquifer. Potential contaminants include concrete, cement grouts and associated additives and drilling fluids. This has been assessed to potentially have a moderate impact, with moderate effect, and therefore is significant. The use of appropriate piling methods will avoid creating hydraulic pathways, such as cracks and cavities between the construction feature and the natural rock. Application of the guidance on protection of aquifers (EA, 2001) and the mitigation measures set out in the draft CoCP will control the materials used in the aquifer, leading to a negligible impact, with neutral effect and therefore is not significant.

Flood risk

- 16.5.8 The assessment shows that there will be no significant increase in risks resulting from all sources of flooding during Stage B1 construction and operation and therefore no significant temporary adverse effects will occur.

Permanent Impacts

Surface water

- 16.5.9 No significant adverse effects to surface water resources have been identified during the assessment.

Groundwater

- 16.5.10 Piling during construction has the potential to impact on groundwater flow in the Chalk aquifer. This may in turn impact on the groundwater abstraction GW92. Although GW92 is located up gradient of the revised scheme, construction will take place inside the outer protection zone¹⁷⁶ of this source. Groundwater flow will be constricted between the piles potentially creating a localised increase in piezometric levels up gradient of the piles and a lowering of piezometric levels on the down gradient side of the piles. Assessment shows that the impact of these changes in piezometric levels is likely to be highly localised and therefore negligible.
- 16.5.11 Retaining walls along the southern and eastern side of the new high speed platforms will extend through the Lynch Hill gravel shallow aquifer and key into the underlying London Clay. This will impact on groundwater flow and quality in the Lynch Hill Gravel. These walls will only intersect a small section of the Lynch Hill Gravel and consequently construction will have a minor impact on groundwater flow and quality, leading to a neutral effect and is therefore not significant. Application of the guidance on protection of aquifers (EA, 2001) and the mitigation measures set out in the draft CoCP will control the materials used in the aquifer, leading to a negligible impact, with neutral effect and therefore is not significant.

¹⁷⁶ The inner protection zone of a private water abstraction is defined as the 50-day travel time from any point below the water table to the source with a minimum 50m-radius and is equivalent to a PWS SPZ1. The outer protection zone of a private water abstraction is defined by a 400-day travel time from a point below the water table and equivalent to SPZ2 at a PWS.

Flood risk

- 16.5.12 The assessment shows that there will be no significant increase in risks resulting from any sources of flooding during construction and therefore no significant permanent adverse effects will occur.

Cumulative effects

- 16.5.13 There are no committed developments that have been identified which will result in significant cumulative effects.

Other mitigation measures

- 16.5.14 There are considered to be no further measures required to mitigate adverse effects on surface water resources, groundwater resources or flood risk.

Cumulative effects

- 16.5.15 There are no committed developments that have been identified which will result in significant cumulative effects.

Summary of likely residual significant effects

- 16.5.16 Following mitigation, no significant residual adverse effects to water resources and flood risk have been identified during construction and operation in Stage B1.

16.6 Effects arising during operation (2033 onwards)

Avoidance and mitigation measures

- 16.6.1 The avoidance and mitigation measures for operation are the same as those set out for Stage B1 operation.

Assessment of impacts and effects

- 16.6.2 The effects during operation are the same as those set out for Stage B1 operation.

Summary of likely residual significant effects

- 16.6.3 Following mitigation, no residual significant adverse effects to water resources and flood risk have been identified during operation of the revised scheme.

Part 2: Additional Provision 3 Environmental Statement

17 Introduction

- 17.1.1 SES2, Part 1B contains an assessment of the environmental effects of the entire revised scheme at Euston. Most of the changes to the scheme at Euston can be carried out under existing powers and on land already included in the Bill. However, there are some minor amendments which require additional provisions in the Bill which have been assessed as part of the revised scheme in Part 1B.
- 17.1.2 The likely significant environmental effects of those minor amendments have been assessed and are reported in this section. Table 49 provides a summary of the specific amendments in the Euston station and approach CFA1 and Figure 16 shows the location of each amendment.

18 Summary of amendments

Table 49: Summary of amendments in CFA 1

Name of amendment	Description of the original scheme	Description of the AP3 revised scheme
Additional land for construction off Stephenson Way. (AP3-001-001)	Not part of the original scheme.	This amendment will temporarily require air rights over additional land to allow oversailing by cranes outside existing Bill limits.
Additional land for utilities diversion at Stanhope Street. (AP3-001-002)	Not part of the original scheme.	Intended for diversion of utilities, following refinement of the utilities strategy for the diversion of multiple services along Hampstead Road. This amendment will temporarily require additional land outside existing Bill limits.
Additional land at Barnby Street and for improvements to open space within the Ampthill Estate. (AP3-001-003)	Some land is included in the original scheme to allow for diversion of utilities from Hampstead Road Bridge through the Ampthill Estate via a temporary utilities bridge across the railway.	This land will still be used for the diversion of utilities. The land required has been extended to allow for improvements to existing open space as mitigation for loss of other publicly accessible space for the revised scheme, over an extended time period. This amendment will permanently require additional land outside existing Bill limits.
Additional land for highway works at Hampstead Road and Harrington Square. (AP3-001-004)	Not part of original scheme.	Intended for minor highway works, including changes to the junction of Harrington Square and Hampstead Road, to allow traffic management during reconstruction of Hampstead Road Bridge. This amendment will temporarily require additional land outside existing Bill limits.
Additional land for the installation of ground anchors at Park Village East, north of Mornington Street Bridge.	Not part of original scheme.	Additional powers are required to allow for the installation of permanent ground anchors beneath the buildings

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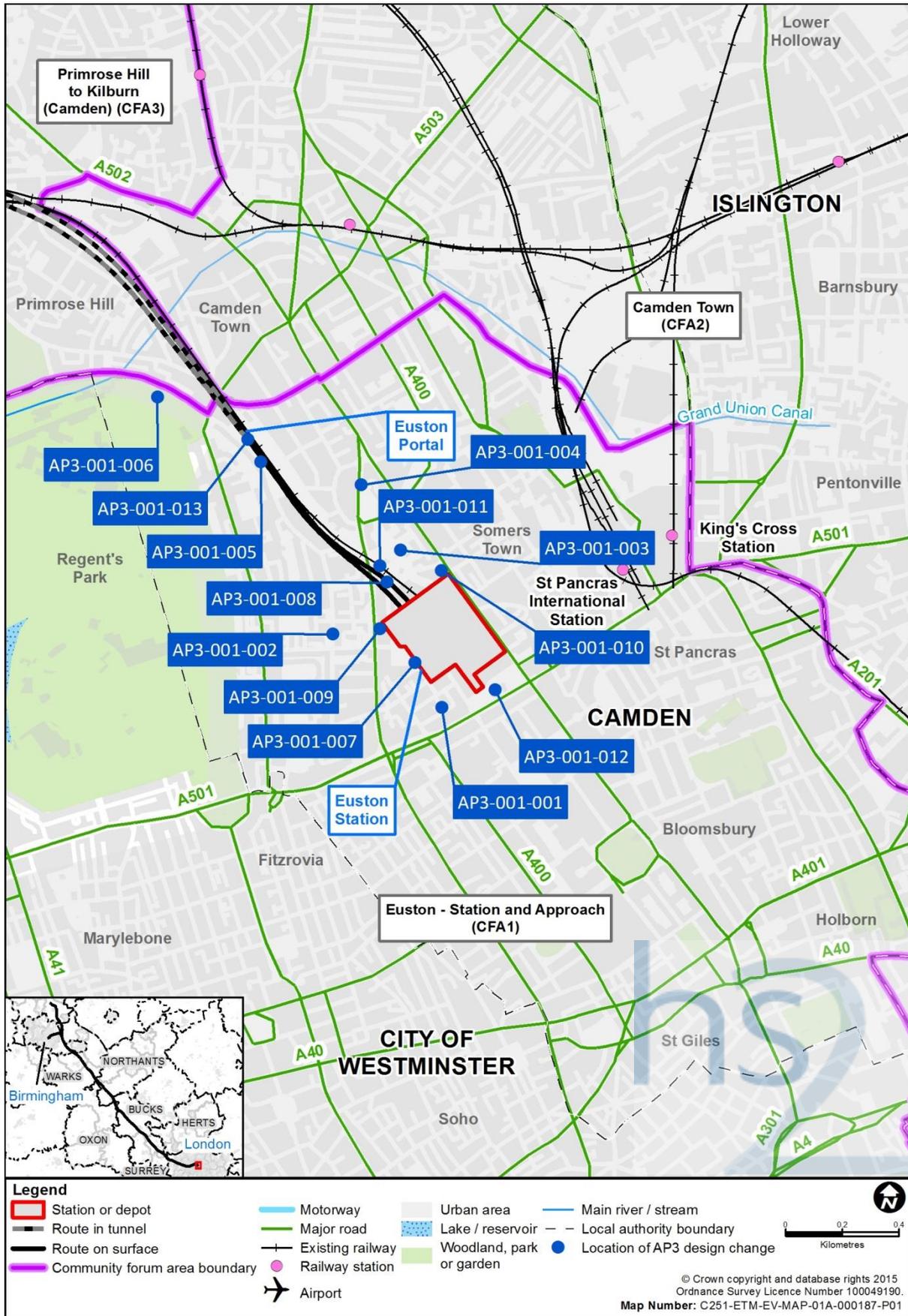
Name of amendment	Description of the original scheme	Description of the AP3 revised scheme
(AP3-001-005)		and gardens to 6 to 28 Park Village East, 1 to 8 Nash House and 12 Park Village West. These ground anchors are needed for the retaining structures. The amendment results from the inclusion of the reinstatement of Line X (AP3 -001-013) in the revised scheme. This amendment will permanently require rights to install ground anchors on additional land outside existing Bill limits.
Additional land for extension to lorry holding area and replacement parking, Regent's Park. (AP3-001-006)	The existing ZSL car park is to be used as a lorry holding area during construction at Euston, until 2026.	The car park will still be used for lorry holding for construction, but the land required will be extended to allow for both an increase in the size of the lorry holding area and replacement of displaced parking. The use will extend until 2033. The replacement parking for ZSL London Zoo will be provided whilst the lorry holding area is in use. Following construction, the land required will be restored to its original use. This amendment will permanently require additional land outside existing Bill limits.
Extension of cycle track along Cobourg Street. (AP3-001-007)	Provision of a cycle track along Cobourg Street.	The cycle track will be extended and will start from Hampstead Road. This amendment requires no land outside existing Bill limits but requires the Bill plans to be amended.
Provision of access road and ramp to high speed station basement from Hampstead Road Bridge. (AP3-001-008)	The original scheme includes a basement providing for plant, fire corridors and escape without the provision for vehicular access.	A larger service basement for the high speed station is to be provided in the revised scheme. Initially, between 2026 and 2033, this will be accessed by lift from an above ground service yard. During construction Stage B1, a vehicle access ramp will be provided from Hampstead Road Bridge to replace the above ground service arrangements. This amendment requires no land outside existing Bill limits but requires the Bill plans to be amended.
Provision of taxi road and cycle track at northern station entrance from Hampstead Road. (AP3-001-009)	The original scheme provides a permanent taxi rank along Cobourg Street. There is no northern entrance to the high speed station.	During construction Stage B1, a road loop, primarily for taxis, will be provided across the deck above the high speed platforms, with an adjoining cycle way leading to cycle parking. This serves the new northern entrance to the high speed station. New open space will be created between these facilities and Hampstead Road. This amendment requires no land outside

SES2 and AP3 ES Volume 2 – CFA1 Euston Station and Approach

Name of amendment	Description of the original scheme	Description of the AP3 revised scheme
		existing Bill limits but requires the Bill plans to be amended.
Provision of loop road for bus stand and welfare facilities, off Eversholt Street. (AP3-001-010)	The original scheme includes the provision of an east west link bridge and a replacement access ramp to the parcels deck of the conventional station at this location.	A bus stand is to be built during construction Stage A to assist operation of the bus station in Euston Square. This bus stand will then be retained as a permanent facility. This amendment requires no land outside existing Bill limits but requires the Bill plans to be amended.
Provision of bridge across railway for temporary utility diversions, south of Hampstead Road Bridge. (AP3-001-011)	The original scheme provides a combined utility and cycle bridge which formed part of a longer cycle track.	This bridge will be provided at a slightly different location and will now only be used for utilities, since the revised scheme allows cyclists to continue to use Hampstead Road Bridge throughout the construction period. This amendment requires no land outside existing Bill limits but requires the Bill plans to be amended.
Addition of the Grade II Euston Lodges and associated structures to Schedule 17 of the Bill. (AP3-001-012)	Not recorded as part of the original scheme.	During construction Stage A, the Grade II listed railings above the underpass will be removed. The underpass is a curtilage structure included as part of the Grade II listed Euston Lodges. The underpass may need to be altered during the works to Euston Square Gardens in construction Stage B1, to allow, for example, structural repairs, when the bus access road above it is removed as part of the restoration of Euston Square Gardens. This requires Table 1 Schedule 17 to the Bill to be amended.
Reinstatement of Line X. (AP3 -001-013)	In the original scheme, Line X and the existing railway dive under beneath the conventional railway approach, north of Mornington Street Bridge, were to be closed, because the retention of Line X conflicted with the high speed railway works.	In the revised scheme, it is proposed to reinstate Line X, close to its original alignment, and the dive under. Line X will need to be closed for three years during high speed railway construction. Changes to the design of the high speed railway structures have been made to allow Line X to run above the eastern high speed track. These works also require longer permanent ground anchors, as set out in AP3-001-005. The reinstatement of Line X itself will not require land outside existing Bill limits, but requires the Bill plans to be amended.

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Figure 16: Location of APs in CFA1



19 Assessment of amendments

19.1 Additional land for construction off Stephenson Way (AP3-001-001)

- 19.1.1 The original scheme included construction works off Stephenson Way. For the revised scheme, additional land has been identified as being required to allow crane oversailing to support these construction works. This amendment will temporarily require air rights over land outside existing Bill limits. The area required is approximately 190m².
- 19.1.2 The additional rights for crane oversailing are not considered to require separate assessment of the effects or proposed mitigation with respect to any environmental topic. This amendment will not give rise to any significant effects.

19.2 Additional land for utilities diversion at Stanhope Street (AP3-001-002)

- 19.2.1 The original scheme included provision for utility works in the vicinity. However, since the Bill submission, there have been refinements of the utilities strategy for the multiple services that cross Hampstead Road Bridge for the revised scheme and this additional land is required for the diversion of utilities. The utility works in Stanhope Street, as a whole, are likely to take up to one year starting in late 2016. This amendment will temporarily require approximately 0.1ha of additional land outside existing Bill limits.
- 19.2.2 The additional land for utilities diversion is not considered to require assessment of the environmental effects or proposed mitigation in respect of: agriculture, forestry and soils; air quality; community; cultural heritage; ecology; land quality; socio-economics; sound, noise and vibration, traffic and transport; and water resources and FRA. However, an assessment was considered to be required in respect of landscape and visual assessment.

Landscape and visual assessment

Scope, assumptions and limitations

- 19.2.3 The assessment scope, key assumptions and limitations for the landscape and visual assessment are as set out in the SES2 (Part 1B), in Section 12.2.

Existing baseline

- 19.2.4 The land required for the amendment is located in the Euston West Post-War Residential LCA, which is described in the SES2 (Part 1B), in Section 12.3.
- 19.2.5 Viewpoint 001.2.017: views north and north-east from Staveley and Waterhead residential blocks on Varndell Street and Viewpoint 001.2.015: Views east along Robert Street are the only viewpoints in CFA1 which are relevant to the amendment. They are described in the SES2 and AP3 ES Volume 5: Appendix LV-001-001.

Future baseline

Construction (2017)

- 19.2.6 The future baseline for construction in 2017 is set out in the SES2 (Part 1B) in Section 12.3.

Effects arising during Stage A construction (2017 - 2026)

Avoidance and mitigation measures

- 19.2.7 The measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction are set out in the SES2 (Part 1B), in Section 12.4.

Assessment of impacts and effects

- 19.2.8 The assessment of landscape and visual effects during construction has been based on the activities occurring during the peak phase of construction. In this instance, all of the utility works are underground and the highway will be reinstated. The only effects that might arise relate to the potential damage to street trees.

Landscape assessment

- 19.2.9 The SES2 (Part 1B), in Section 12.4, reports that the revised scheme would have a major adverse significant effect on the Euston West Post-War Residential LCA during construction Stage A. This arises principally from the major construction works for the high speed station and railway which are confined to the eastern part of the LCA. The assessment notes that utility works, road closures and diversions and construction traffic will affect many smaller streets across this area and that these will all contribute to increased activity and reduced tranquillity in this LCA.
- 19.2.10 The amendment, of itself, represents a minor element of the works in this LCA and will not give rise to a significant landscape effect.

Visual assessment

- 19.2.11 There are two viewpoints assessed in the SES2 (Part 1B) relevant to this amendment. These are affected by the revised scheme due to demolition and construction works, including demolition of buildings and resultant opening up of views; the Hampstead Road Bridge demolition and reconstruction works; removal of mature trees from St. James's Gardens and from communal gardens; removal of street trees from Robert Street as a result of utility diversion works and the presence of cranes in the middle ground and background of views.
- 19.2.12 The viewpoints, with the significant effects reported in the SES2 (Part 1B), Section 12.4, are:
- viewpoint 001.2.017: views north and north-east from Staveley and Waterhead residential blocks on Varndell Street (moderate adverse); and
 - viewpoint 001.2.015: views east along Robert Street (moderate adverse).
- 19.2.13 The amendment will require a small area of additional land for utilities diversion works at the southern end of Stanhope Street, where other utility diversion works will already be taking place. Neither of these viewpoints is in direct sight of the utility

works proposed in this amendment. The amendment does not, of itself, give rise to a significant visual effect in construction Stage A.

Effects arising during Stage B1 construction and operation

- 19.2.14 These works are completed in construction Stage A and therefore will not give rise to any significant landscape or visual effects during Stage B1 construction or operation.

Effects arising during operation from 2033

- 19.2.15 This amendment will not give rise to any significant landscape or visual effects during operation from 2033.

Summary of likely residual significant effects

- 19.2.16 There will be no likely residual significant effects on landscape character or visual receptors, as a result of the amendment.

19.3 Additional land at Barnby Street and for improvements to open space within the Ampthill Estate (AP3-001-003)

- 19.3.1 In the revised scheme, there are proposed diversions of utilities across open areas in the Ampthill Estate and in Barnby Street. Additional land is required to allow for improvements to existing open space, including the potential for a play area, as mitigation for loss of other publicly accessible space in the revised scheme which covers an extended time period. This amendment will permanently require approximately 0.6ha of additional land outside existing Bill limits.
- 19.3.2 The open space improvements on the additional land required at Barnby Street and within Ampthill Estate are not considered to require separate assessment of the effects or proposed mitigation with respect to any environmental topic. This amendment will not give rise to any significant effects.

19.4 Additional land for highway works at Hampstead Road and Harrington Square (AP3-001-004)

- 19.4.1 In the original scheme, highway works were identified to support the construction of A400 Hampstead Road Bridge. Since the Bill submission, additional land has been identified for the revised scheme to allow changes to the junction of Harrington Square and Hampstead Road, in order to facilitate traffic management during reconstruction of Hampstead Road Bridge. This amendment will temporarily require approximately 0.2ha of additional land outside existing Bill limits.
- 19.4.2 The highway works on the additional land required are not considered to require separate assessment of the effects or proposed mitigation with respect to any environmental topics. This amendment will not give rise to any significant effects.

19.5 Additional land for the installation of ground anchors at Park Village East, north of Mornington Street Bridge (AP3-001-005)

- 19.5.1 The original scheme required some land at Park Village East to allow the sub-surface installation of temporary ground anchors beneath gardens and buildings. In order to

ensure that settlement of the listed houses in Park Village East can be kept within acceptable limits, additional land is needed beneath the buildings and gardens of 6 to 28 Park Village East, 1-8 Nash House and the garden of 12 Park Village West to allow for the installation of permanent ground anchors for the retaining structures. These could be up to 50m in length, extending from the face of Park Village East retaining wall beneath these buildings and gardens. This requirement results from the inclusion of the reinstatement of Line X (AP3-001-013) in the revised scheme. This amendment will permanently require rights to install ground anchors over approximately 0.5ha of additional land outside existing Bill limits.

- 19.5.2 The additional land rights are not considered to require separate assessment of the effects or proposed mitigation with respect to any environmental topic. This amendment will not give rise to any significant effects.

19.6 Additional land for extension to lorry holding area and replacement parking, Regent's Park (AP3-001-006)

- 19.6.1 The original scheme identified that off-site lorry holding areas are likely to be required to marshal lorries during construction at Euston. The ZSL London Zoo car park in Regent's Park, just north of Gloucester Gate Bridge, was identified in the original scheme to be used for lorry holding during construction between 2017 and 2026. In the revised scheme, a slightly larger lorry holding area is now proposed to be used for both Stage A and Stage B1 construction between 2017 and 2033. Following consultations with the Royal Parks and other bodies, it is now proposed to provide replacement parking for ZSL London Zoo during the period when the lorry holding area is being used.
- 19.6.2 The replacement parking area will be used between 2017 and 2033, after which it will be reinstated and returned to its previous condition. The additional land required is outside the existing limits of the Bill. The additional land included is approximately 1.3ha although the extension to the lorry holding area, replacement parking and associated works will only require a proportion of this.
- 19.6.3 The revised lorry parking and replacement parking on the additional land required at ZSL are not considered to require an assessment of the environmental effects or proposed mitigation for: agriculture, forestry and soils; air quality; community; cultural heritage; land quality; socio-economics; sound, noise and vibration, traffic and transport; and water resources and flood risk. However, an assessment was considered to be required for ecology and landscape and visual assessment.

Ecology

Scope, assumptions and limitations

- 19.6.4 The scope and methodology of the ecological assessment are as set out in SES2 (Part 1B) Section 10.2.

Existing baseline

- 19.6.5 SES2 (Part 1B), Section 10.3 describes the ecological baseline relevant to the assessment of designated sites, habitats and species recorded in this area.

Future baseline

Construction (2017) and construction and operation (2026)

- 19.6.6 The future baseline for construction in 2017 and construction and operation is set out in the SES2 (Part 1B) Section 10.3.

Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

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

Assessment of impacts and effects

Designated sites

- 19.6.8 The amendment will increase the amount of land within the designated Regent's Park SMI that is required. For the original scheme, it was assumed that 0.5ha of Regent's Park SMI would be permanently lost for construction of the lorry holding area and utilities works.
- 19.6.9 In the revised scheme an additional 0.8ha will be required for the replacement parking. This represents approximately 1% of the designated site and comprises mainly hard standing, grassland, eight mature trees and 13 semi-mature trees. This additional permanent loss will not have a significant adverse effect on the integrity of the Regent's Park SMI.

Habitats

- 19.6.10 The works for the replacement parking at ZSL London Zoo will result in the loss of approximately 0.2ha of grassland. Whilst this will have a permanent adverse effect, it will be of negligible significance.
- 19.6.11 The replacement parking will result in the loss of eight mature and 13 semi-mature trees. This will have a permanent adverse effect on the conservation status of this habitat type at the local/parish level, which is not significant.

Species

- 19.6.12 The amendment will result in the loss of some areas of suitable bat foraging habitat and a transient pipistrelle roost at Regent's Park. Following a precautionary assessment, these losses could have a permanent adverse effect on the local bat assemblage that will be significant at up to the county/metropolitan level.
- 19.6.13 The extension of the car park to the south will result in a loss of approximately 0.2ha of hedgehog foraging habitat, which is not considered significant, given that connectivity remains to other habitats within the car park and nearby within the park. There will be an increased risk of hedgehogs being hit by construction vehicles during the construction period, but this will be minimal given that the majority of construction work will be in the day time when hedgehogs are less active. No significant effect on the conservation status of hedgehog is predicted.

Other mitigation

- 19.6.14 The loss of any bat roosts in buildings and trees will be compensated for through the provision of alternative compensatory roosts. Following implementation of the measures proposed, it is likely that any adverse effects on bats during the construction of the parking at ZSL will be reduced to a level where there will be no significant effects on the conservation status of the species concerned.

Summary of likely residual significant effects

- 19.6.15 The mitigation, compensation and enhancement measures described above will reduce the effects during construction Stage A to a level that is not significant.

Effects arising during Stage B1 construction and operation (2026–2033)

Avoidance and mitigation measures

- 19.6.16 Compensation for the loss of part of Regent’s Park SMI and the grassland habitat and trees will include reinstatement of the habitats, including planting of appropriate species of trees and the creation of species-rich neutral grassland. This restoration will take place when the lorry holding area is returned to Royal Parks once construction works are completed in 2033.

Assessment of impacts and effects

- 19.6.17 There will be no new impacts on ecological resources arising during construction Stage B1.

Other mitigation

- 19.6.18 The area required for replacement parking is to be reinstated once the lorry parking use has ceased. This will incorporate provision for planting and other ecological measures in compensation for losses of habitat. These mitigation measures will be provided at the end of construction Stage B1.

Summary of likely residual significant effects

- 19.6.19 There will be no new impacts (or residual effects) on ecological resources arising from Stage B1 construction.

Effects arising during operation (2033 onwards)

Summary of likely residual significant effects

- 19.6.20 Once the replacement parking area has been reinstated and has become established, there will be no residual significant effects during operation.

Landscape and visual assessment

Scope, assumptions and limitations

- 19.6.21 The assessment scope, key assumptions and limitations for the landscape and visual assessment are as set out in SES2 (Part 1B), Section 12.2.

Existing baseline

- 19.6.22 A summary of the baseline information relevant to the assessment of the amendment is provided in the SES2 (Part 1B), in section 12.3.
- 19.6.23 The area of land required for the amendment is located in the Regent’s Park and Primrose Hill Public Open Space LCA, which is described in the SES2 and AP3 ES Volume 5: Appendix LV-001-001.
- 19.6.24 Viewpoint 003.4.036: View north-east from the Outer Circle, Regent’s Park is the only viewpoint in CFA1 relevant to this amendment. It is described in the SES2 and AP3 ES Volume 5: Appendix LV-001-001.

Future baseline

Construction (2017)

- 19.6.25 The future baseline for construction in 2017 is reported in the SES2 (part 1B), in Section 12.3.

Operation (2026)

- 19.6.26 The future baseline for operation in 2026 is reported in the SES2 (Part 1B) in Section 12.3.

Effects arising during Stage A construction (2017–2026)

Avoidance and mitigation measures

- 19.6.27 The measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction are as stated in the SES2 (Part1B) in Section 12.4.

Assessment of impacts and effects

- 19.6.28 The assessment of landscape and visual effects in construction has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works will take place.

Landscape assessment

- 19.6.29 The area of land required for the amendment is in the Regent’s Park and Primrose Hill Public Open Space LCA.
- 19.6.30 The SES2 (Part 1b) also reports a non-significant effect on the Regent’s Park and Primrose Hill Public Open Space LCA during construction Stage A of the revised scheme. The amendment does not give rise to a significant effect on the LCA.

Visual assessment

- 19.6.31 The SES2 (Part 1b) reports a significant effect on viewpoint 003.4.036: View north east from the Outer Circle, Regent’s Park on account of mature tree cover around the worksite, the immature hedging and replacement tree planting established in construction Stage A, and the views of the lorry holding area, associated hoardings and increased intensity of vehicular movements.

- 19.6.32 The amendment does not, of itself, give rise to a significant visual effect in construction Stage A.

Effects arising during Stage B1 construction and operation (2026–2033)

Avoidance and mitigation measures

- 19.6.33 The measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction are set out in SES2 (Part1B), in section 12.5.

Assessment of impacts and effects

- 19.6.34 The assessment of landscape and visual effects in construction has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works will take place.

Landscape assessment

- 19.6.35 The SES2 reports a non-significant effect on the Regent’s Park and Primrose Hill Public Open Space LCA during construction Stage B1. The amendment does not give rise to a significant landscape effect on the LCA during construction Stage B1.

Visual assessment

- 19.6.36 The SES2 reports a non-significant effect during construction Stage B1 on Viewpoint 003.2.008: View east from Gloucester Gate. The amendment does not give rise to significant effects on visual receptors during construction Stage B1.

Effects arising during operation (2033 onwards)

- 19.6.37 This amendment will not give rise to any significant landscape or visual effects during operation from 2033.

19.7 Extension of cycle track along Cobourg Street (AP3-001-007)

- 19.7.1 The original scheme provided a cycle track along Cobourg Street. In the revised scheme, the cycle track is being extended and will start from Hampstead Road. This amendment does not require land outside existing Bill limits but requires the Bill plans to be amended.
- 19.7.2 The extension of the cycle track is not considered to require a separate assessment of the effects or proposed mitigation with respect to any environmental topic. This amendment will not give rise to any significant effects.

19.8 Provision of access road and ramp to high speed station basement from Hampstead Road Bridge (AP3-001-008)

- 19.8.1 The original scheme includes a basement for plant, fire corridors and escape, which did not require vehicular access. Since the submission of the Bill, the need for a larger service and logistics basement for the high speed station has been identified and will be provided in the revised scheme. Initially, between 2026 and 2033, the basement will be accessed by lift from an above ground service yard. During construction Stage B1, a vehicle access road and ramp will be provided from A400 Hampstead Road

Bridge to replace the above ground service arrangements after 2033. This amendment requires no land outside existing Bill limits, but requires the Bill plans to be amended.

- 19.8.2 The provision for the access road and ramp to the high speed station basement is not considered to require separate assessment of the effects or proposed mitigation with respect to any environmental topic. This amendment will not give rise to any significant effects.

19.9 Provision of taxi road and cycle track at northern station entrance from Hampstead Road (AP3-001-009)

- 19.9.1 The original scheme provides a permanent taxi rank located in Cobourg Street, with no northern entrance to the high speed station. Since the Bill submission, the future requirement for taxi facilities for the entire station has been reviewed. During construction Stage B1, a loop road, primarily for a taxi rank, will be provided across the deck above the high speed platforms, with an adjoining cycle way, leading to cycle parking. This serves the new northern entrance to the high speed station. New open space will be created between these facilities and Hampstead Road. This amendment does not require land outside the existing Bill limits but requires the Bill plans to be amended.
- 19.9.2 The provision of a taxi road and cycle track at the northern station entrance is not considered to require a separate assessment of the effects or proposed mitigation with respect to any environmental topic. This amendment will not give rise to any significant effects.

19.10 Provision of loop road for bus stand and welfare facilities, off Eversholt Street (AP3-001-010)

- 19.10.1 At this location, the original scheme included the eastern end of the proposed east west link bridge and a replacement access ramp to the parcels deck of the conventional station, which are not included in the revised scheme.
- 19.10.2 In the revised scheme, a bus stand with welfare facilities will be provided at the end of construction Stage A to assist operation of the bus station in Euston Square, with the bus stand being retained as a permanent facility. Modular offices up to six storeys in height for project staff will also be provided on this site between about 2021 and 2033, partly over the bus stand. These will be removed at the completion of construction. This amendment requires no land outside existing Bill limits but requires an amendment to the Bill plans.
- 19.10.3 The provision of the bus stand and welfare facilities is not considered to require an assessment of the environmental effects or proposed mitigation for: agriculture, forestry and soils; air quality; community; cultural heritage; ecology; land quality; socio-economics; sound, noise and vibration; traffic and transport; and water resources and FRA. However, assessment was considered to be required for landscape and visual assessment.

Landscape and visual assessment

Scope, assumptions and limitations

- 19.10.4 The assessment scope, key assumptions and limitations for the landscape and visual assessment are as set out in SES2 (Part 1B) Section 12.2.

Existing baseline

- 19.10.5 A summary of the baseline information relevant to the assessment of the amendment is provided in the SES2 (Part 1B), Section 12.3.
- 19.10.6 The area of land required for the amendment is located in the Euston station Gateway LCA, which is described in the SES2 and AP3 ES Volume 5: Appendix LV-001-001.
- 19.10.7 Viewpoint 002.2.007: view west from Eversholt Street, between Phoenix Road and Polygon Road and Viewpoint 002.2.014: View south and west from apartments on Barnby Street are the only viewpoints in CFA1 relevant to the amendment. They are described in the SES2 and AP3 ES Volume 5: Appendix LV-001-001.

Future baseline

Construction (2017)

- 19.10.8 The future baseline for construction in 2017 is reported in the SES2 (Part 1B), in Section 12.3.

Operation (2026)

- 19.10.9 The future baseline for operation in 2026 is reported in the SES2 (Part 1B), in Section 12.3.

Effects arising during Stage A construction (2017-2026)

Avoidance and mitigation measures

- 19.10.10 The measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction are set out in the SES2 (Part1B) in Section 12.4.

Assessment of impacts and effects

- 19.10.11 The assessment of landscape and visual effects in construction has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works will take place.

Landscape assessment

- 19.10.12 The area of land required for the amendment is in the Euston station Gateway LCA.
- 19.10.13 The SES2 reports a non-significant effect for the revised scheme on the Euston station Gateway LCA during construction Stage A.
- 19.10.14 The amendment, of itself, represents a minor element of the works in this LCA and does not give rise to a significant landscape effect.

Visual assessment

- 19.10.15 Two viewpoints in the vicinity of the amendment were assessed as being affected by the revised scheme and are described in the SES2 (Part 1B), Section 12. These viewpoints, with the effects reported in the SES2 (Part1B) are:
- 19.10.16 Viewpoint 002.2.007: view west from Eversholt Street, between Phoenix Road and Polygon Road (moderate adverse); and
- 19.10.17 Viewpoint 002.2.014: view south and west from apartments on Barnby Street (moderate adverse).
- 19.10.18 Viewpoint 002.2.007 is affected on account of direct and close views of construction works at the edge of Euston station, the possible loss of trees resulting from utility diversion works, the demolition of the existing Royal Mail NW1 delivery office and the presence of a satellite compound in the foreground of the view. Viewpoint 002.2.014 is affected on account of direct and close views of demolition of the Royal Mail NW1 delivery office, construction activities associated with bus stand and welfare facilities, the satellite compound and the removal of street trees on Barnby Street with additional middle distance views of piling works, the demolition and reconstruction of Hampstead Road Bridge and the demolition of buildings on Hampstead Road in the background.
- 19.10.19 The amendment will be a small change in relation to the scale of the revised scheme at this location and does not, of itself, give rise to a significant effect on visual receptors.

Effects arising during Stage B1 construction and operation (2026–2033)

- 19.10.20 The amendment will not give rise to any significant landscape or visual effects during construction Stage B1.

Effects arising during operation (2033 onwards)

- 19.10.21 This amendment will not give rise to any significant landscape or visual effects during operation from 2033.

Summary of likely residual significant effects

- 19.10.22 There will be no likely significant residual effects on landscape character or visual receptors, as a result of the amendment.

19.11 Provision of bridge across railway for temporary utility diversions, south of Hampstead Road Bridge (AP3-001-011)

- 19.11.1 The original scheme included provision for a combined utility and cycle bridge across the railway south of A400 Hampstead Road Bridge. Since the Bill submission, the bridge will be provided at a slightly different location and will now only be used for utilities, since the revised scheme allows cyclists to continue to use Hampstead Road Bridge throughout the construction period. The provision of a bridge for temporary utilities diversions is not considered to require a separate assessment of the effects or proposed mitigation with respect to any environmental topics. This amendment will not give rise to any significant effects.

19.12 Addition of the Grade II Euston Lodges and associated structures to Schedule 17 of the Bill (AP3-001-012)

- 19.12.1 This is an additional provision to amend Table 1, Schedule 17 of the Bill.
- 19.12.2 Since Bill submission, it has been noted that the historic buildings list entry for the Euston Lodges (part of EUS004), which are listed Grade II, includes reference to a pedestrian underpass between the east and west parts of Euston Square Gardens, which has the access road to the bus station above. There are railings across each end of this underpass, which has been partly infilled. The railings are separately listed.
- 19.12.3 In the revised scheme, during construction Stage A, the Grade II listed railings above the underpass will be removed. The underpass is a curtilage structure included as part of the Grade II listed Euston Lodges, which are to be retained and protected during the works. It may need to be altered during the works to Euston Square Gardens, in Stage B1, to allow, for example structural repairs, when the bus access road above it is removed as part of the restoration of Euston Square Gardens.
- 19.12.4 This amendment is not considered to require further assessment of the effects with respect to any environmental topic. In SES2 (Part 1B), Section 9.5.8, the removal of the railings and the alterations to the underpass are reported as a moderate adverse significant effect.

19.13 Reinstatement of Line X (AP3-001-013)

- 19.13.1 In the original scheme, Line X and the existing railway dive under beneath the conventional railway approach, north of Mornington Street Bridge, were to be closed as retention of Line X conflicted with the high speed railway works, as designed.
- 19.13.2 In the revised scheme, it is proposed to reinstate Line X close to its original alignment and reuse the dive under. This will provide greater resilience and flexibility for the operation of the conventional station. Line X will need to be closed for three years during high speed railway construction. In the revised scheme, changes to the design of the high speed railway structures have been made to allow Line X to run above the eastern high speed track. These works also require permanent ground anchors as set out in the amendment AP3-001-005.
- 19.13.3 The reinstatement of Line X, of itself, does not require land outside the existing Bill limits but requires the Bill plans to be amended.
- 19.13.4 The reinstatement of Line X is not considered to require an assessment of the environmental effects or proposed mitigation for: agriculture, forestry and soils; air quality; cultural heritage; ecology; land quality; socio-economics; traffic and transport; and water resources and FRA.
- 19.13.5 In respect of other environmental topics, SES2 (Part1B) acknowledges that in respect of sound, noise and vibration, the reinstatement is likely to extend the duration of significant adverse effects on nearby residents, in construction Stage A, although the levels of significance will not be made worse. The assessment of these effects for the revised scheme has taken all of the works in this location into account and it is not possible to separate out the specific effects of the Line X reinstatement. The SES2 (Part1B) reports the construction noise effects fully in Section 14.3.

- 19.13.6 In respect of community and landscape and visual assessment, the reinstatement works cannot be separated out from the assessment of the effects of all of the other works in this location. In relation to both topics, significant adverse effects in construction Stage A are reported in Sections 8.4 and 12.4 respectively of SES2 (Part 1B).

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