LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 2 | Community Forum Area report

CFA2 | Camden Town and HS1 Link

November 2013

ES 3.2.1.2

VOL 2

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Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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Structure of the HS2 Phase One Environmental Statement

The Environmental Statement (ES) documentation comprises:

- Non-technical summary (NTS) – which provides a summary in non-technical language of the Proposed Scheme, the likely significant environmental effects of the Proposed Scheme, both beneficial and adverse, and the means to avoid or reduce the adverse effects;
- Volume 1: Introduction to the ES and the Proposed Scheme. This describes High Speed Two (HS2), and the environmental impact assessment process, the approach to consultation and engagement, details of the permanent features and generic construction techniques as well as a summary of main strategic and route-wide alternatives and local alternatives (prior to 2012) considered;
- Volume 2: Community forum area reports and map books – 26 reports and associated map books providing a description of the scheme and of environmental effects in each area;
- Volume 3: Route-wide effects – provides an assessment of the effects of the Proposed Scheme where it is not practicable to describe them within the CFA descriptions in Volume 2;
- Volume 4: Off-route effects – provides an assessment of the off-route effects of the Proposed Scheme;
- Volume 5: Appendices and map books – contains supporting environmental information and associated map books; and
- Glossary of terms and list of abbreviations – contains terms and abbreviations, including units of measurement, used throughout the ES documentation.

1 Introduction

1.1 Introduction to HS2

1.1.1 High Speed Two (HS2) is a new high speed railway proposed by the Government to connect major cities in Britain. Stations in London, Birmingham, Leeds, Manchester, South Yorkshire and the East Midlands will be served by high speed trains running at speeds of up to 360kph (225mph).

1.1.2 HS2 is proposed to be built in two phases. Phase One, the subject of this ES, will involve the construction of a new railway line of approximately 230km (143 miles) between London and Birmingham. Construction will begin in 2017 and the line will become operational by 2026; with a connection to the West Coast Main Line (WCML) near Lichfield and to the existing HS1 railway line in London.

1.1.3 During Phase One beyond the dedicated high speed track, high speed trains will connect with and run on the existing WCML to serve passengers beyond the HS2 network to destinations in the north. A connection to HS1 will also allow some services to access that high speed line through east London and Kent and connect with mainland Europe via the Channel Tunnel.

1.1.4 Phase Two will involve the construction of lines from Birmingham to Leeds and Manchester; with construction commencing approximately 2023 and planned to be operational by 2033.

1.1.5 Section 4 of Volume 1 describes the anticipated operational characteristics of HS2, including the anticipated frequency of train services. As Volume 1 shows, the frequency of trains is expected to increase over time and to increase further upon opening of Phase Two. In assessing the environmental effects of the Proposed Scheme the anticipated Phase 2 operational frequency has been used. For further detail of the anticipated operation of the Proposed Scheme in the Camden Town and HS1 link area (CFA2), see Section 2.4.

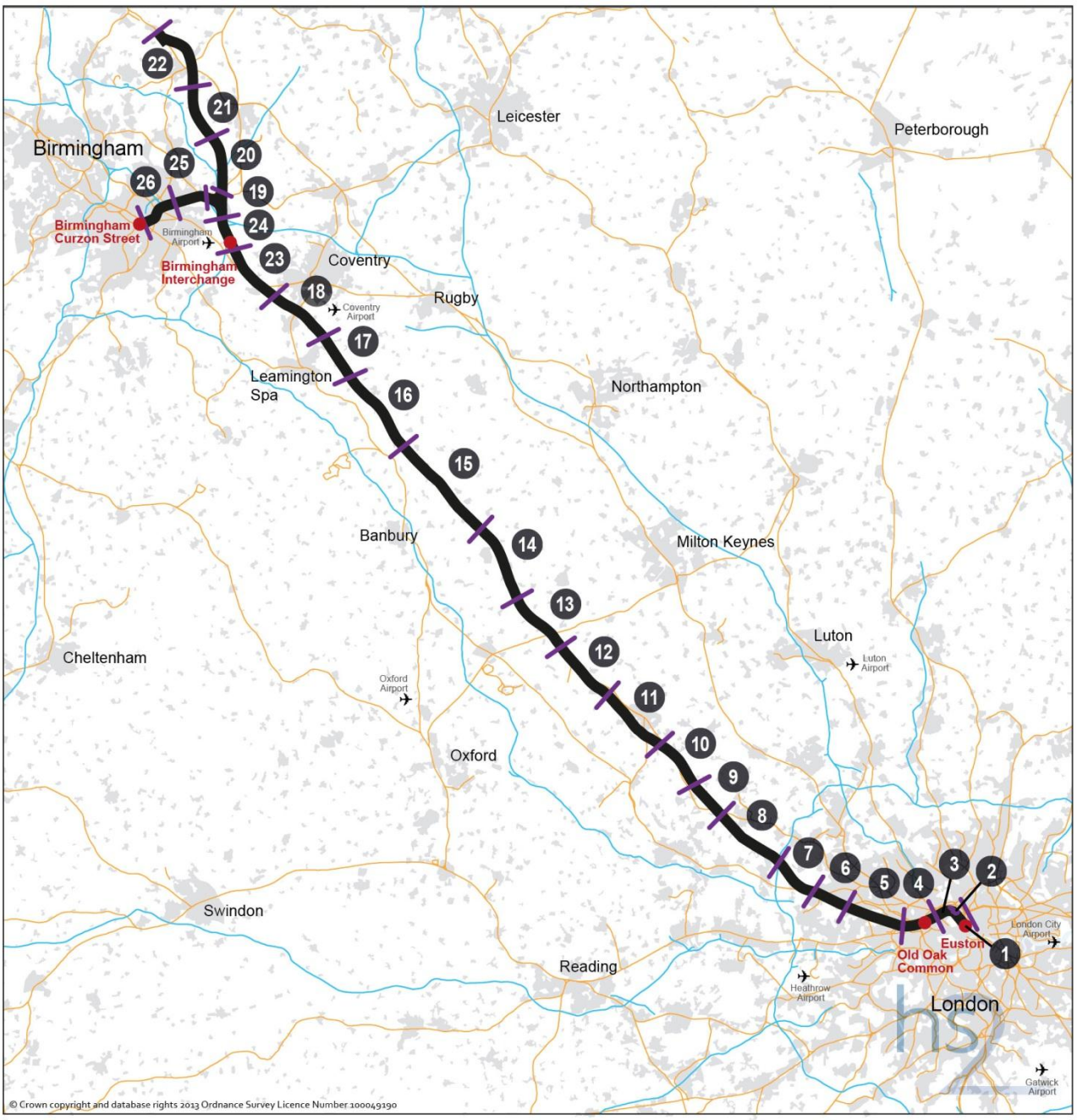
1.1.6 The Government believes that the HS2 network should link to Heathrow and its preferred option is for this to be built as part of Phase Two. However, the Government has since taken the decision to pause work on the Heathrow link until after 2015 when it expects the Airports Commission to publish its final report on recommended options for maintaining the country's status as an international aviation hub.

1.1.7 For consultation and environmental assessment purposes, the proposed Phase One route has been divided into 26 community forum areas (CFA), as shown in Figure 1. This has enabled wider public engagement on the Proposed Scheme design and on the likely adverse and beneficial effects.

1.2 Purpose of this report

1.2.1 This CFA report presents the likely significant effects of the construction and operation of the Proposed Scheme on the environment within CFA2 (Camden Town and HS1 Link).The report describes the mitigation measures that are proposed for the purpose of avoiding, reducing or managing the likely significant adverse effects of the Proposed Scheme on the environment within CFA2.

Figure 1: HS2 Phase One route and community forum areas



1.3 Structure of this report

1.3.1 This report is divided into the following sections:

- Section 1 – an introduction to HS2 and the purpose and structure of this report.
- Section 2 – overview of the area, description of the Proposed Scheme within the area and its construction and operation, and a description of the main local alternatives.
- Sections 3-13 – an assessment for the following environmental topics:
  - agriculture, forestry and soils (Section 3);
  - air quality (Section 4);
  - community (Section 5);
  - cultural heritage (Section 6);
  - ecology (Section 7);
  - land quality (Section 8);
  - landscape and visual assessment (Section 9);
  - socio-economics (Section 10);
  - sound, noise and vibration (Section 11);
  - traffic and transport (Section 12); and
  - water resources and flood risk assessment (Section 13).

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

1.3.3 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) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2).

1.3.4 Where appropriate, potential climate change impacts and adaptation measures are discussed in the relevant environmental topic section. Volume 1 and Section 6A of the SMR Addendum also include additional information about climate change adaptation and resilience.

1.3.5 The maps relevant to Camden Town and HS1 Link are provided in a separate corresponding document entitled Volume 2, CFA2 Map Book, which should be read in conjunction with this report.

1.3.6 The Proposed Scheme described in this report is that shown on the Map Series CT-05 (construction) (Volume 2, CFA2 Map Book) and CT-06 (operation) (Volume 2, CFA2 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and other details within the limits shown on the plans and sections submitted to Parliament as set out in the Bill, and this flexibility is included within the scope of the environmental impact assessment. Further explanation is provided in Volume 1, Section 1.4.

1.3.7 In addition to the environmental topics covered in Sections 3-13 of this report, electromagnetic interference is addressed in Volume 1 and climate (greenhouse gas emissions and carbon) and waste and material resources are addressed in Volume 3. An assessment of potential environmental effects beyond the CFA has also been undertaken and this 'off-route' assessment is reported in Volume 4.

2 Overview of the area and description of the Proposed Scheme

2.1 Overview of the area

2.1.1 The Camden Town and HS1 Link area (CFA2) extends from the A5200 York Way in the east, to Regent's Park Road Bridge in the west. The HS1-HS2 Link is a short section of track which will link HS2 services to the existing HS1 alignment. It is approximately 2.3km in length and will run on connected viaducts (the HS1 Viaduct, the North London Line viaduct, the Kentish Town Viaduct and the Chalk Farm Viaduct) which, with the exception of the HS1 Viaduct, currently serve the North London Line (NLL) and freight services. Two Network Rail (NR) tracks will be installed on the disused track formation on the north side of the viaducts, with one retained on the southern side, providing a total of three tracks available for the NLL and freight services. HS2 services will run on an alignment on the south side of the viaducts, where previously the southernmost NR tracks had been (see Maps CT-06-003a, CT-06-004a and CT-06-143, Volume 2, CFA2 Map Book).

2.1.2 Euston – Station and Approach (CFA1) lies to the south and Primrose Hill to Kilburn (Camden) (CFA3) lies to the west, as shown in Figure 2.

Settlement, land use and topography

2.1.3 The urban environment in this area largely comprises Victorian terraced housing surrounding the historic core of Camden. There is industrial, commercial and residential development adjacent to the main rail, canal and road infrastructure. The area is heavily urbanised with no surface watercourses present other than the Grand Union Canal (Regent's Canal)[1].

2.1.4 The area is generally flat and any minor changes in topography tend to be masked by overlying urban development.

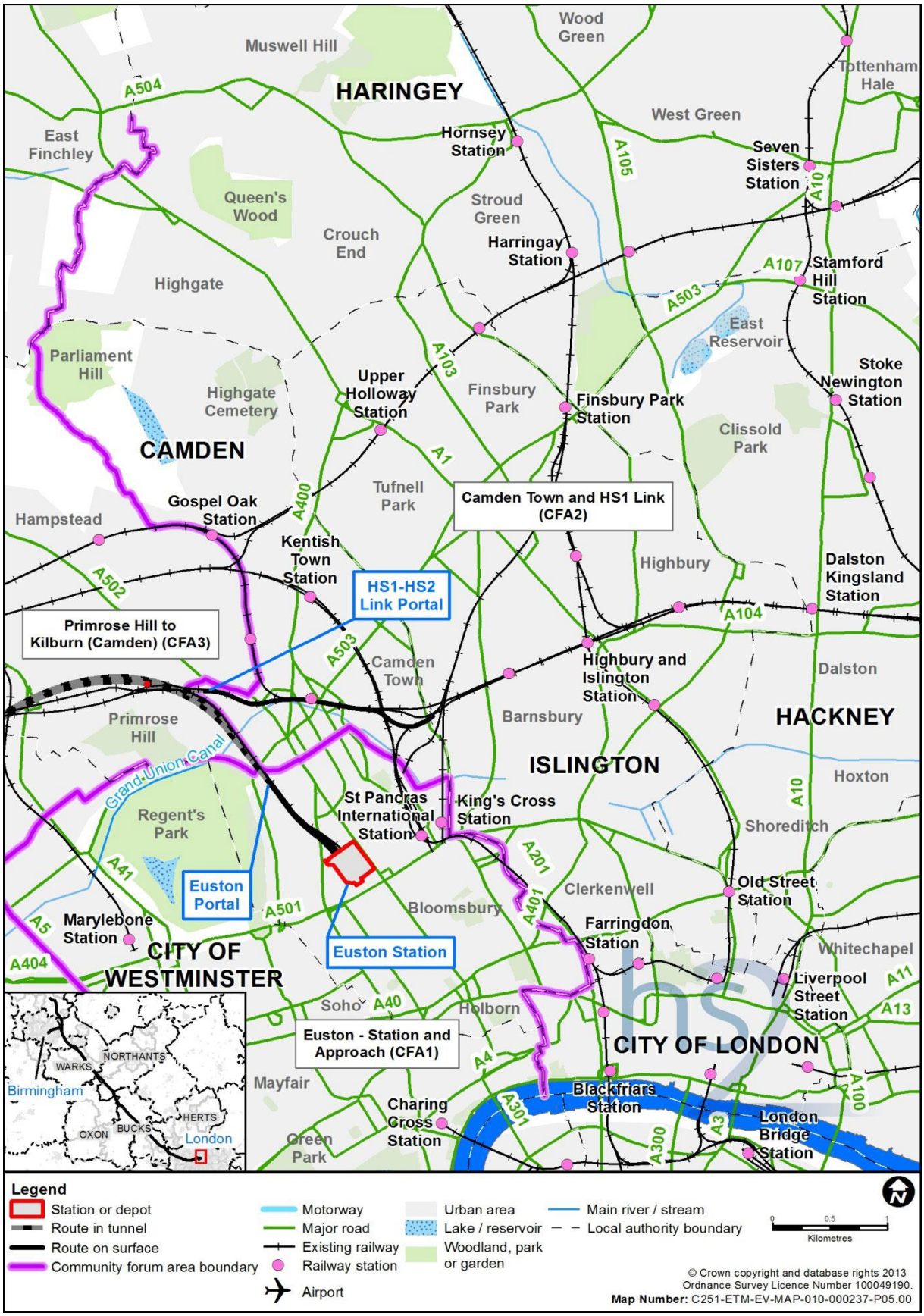
Key transport infrastructure

2.1.5 The principal highways through the area include the A5200 York Way, A5202 St Pancras Way, A503 Camden Road, A400 Kentish Town Road and A502 Chalk Farm Road.

2.1.6 The Regent's Canal creates a linear corridor running from east to west through the area. It is used by recreational craft and has regional historical significance for London. The adjacent canal towpath is used by walkers and cyclists.

[1] The section of the Grand Union Canal that passes through this part of Camden is known as the Regent's Canal and will be referred to as such throughout this document except where baseline data sources specifically refer to the Grand Union Canal.

Figure 2: Area context map



2.1.7 The NLL, which is part of the London Overground railway network, runs on viaduct and numerous bridges across the local roads from east to west through the area. There is a NLL station at Camden Road. The railway infrastructure dominates the visual character of the areas through which it passes. The route of the Proposed Scheme will cross the Midland Main Line (MML) to the south of Agar Grove and east of Camley Street.

2.1.8 The London Underground Northern Line runs north-south under the area, with stations at Camden Town and Chalk Farm.

2.1.9 There are no designated footpaths and bridleways in the area although there are public rights of way (PRoW[2]) on pavements alongside public highways. There is a cycle hire docking station near A502 Chalk Farm Road and several streets in the area are on the London Cycle Network with many routes on streets to the north of the Regent's Canal.

Socio-economic profile

2.1.10 To provide a socio-economic context for the area, data for the following demographic character areas (DCA) have been used: Camden Town East; and Camden Town West[3]. In total, the population of the DCA is approximately 13,600. The area's labour market slightly underperforms compared to England's as a whole; unemployment at 8% is slightly higher than the national level of 7%, while 65.9% of the population aged 16-74 is economically active compared to the national figure of 69.9%[4]. There are approximately 18,000 people who work within the area[5].

Notable community facilities

2.1.11 Shops and services are present throughout the area and are focused on A502 Camden High Street and A400 Kentish Town Road (both crossed by the route). Camden Market, centred on Camden Lock and Camden High Street, is an important local and district resource which attracts large numbers of visitors.

2.1.12 Community facilities in the area include a community centre on Camley Street, the Maiden Lane Community Centre on St Paul's Crescent, the Castlehaven Community Centre on Castlehaven Road, and two libraries. There are also pre-school education facilities on Buck Street, Agar Grove Estate, and Alexander Road in Kentish Town. There are two primary schools (the closest being Holy Trinity and St Silas Church of England Primary School approximately 200m north of the centre line of the route) and one high school, the Camden School for Girls, in the area. In addition, as part of plans being progressed by the local education authority, Hawley Infant School is to be

[2] For ease of discussion, PRoW has been used throughout the document to describe pavements alongside public highways.
[3] A DCA represents a community that, depending on the area, may consist of a local ward, neighbourhood or village(s).
[4] Data comes from the 2011 Population Census.
[5] Data comes from the 2011 business register and employment survey.

relocated from Buck Street to Hawley Road in 2016. The Royal Veterinary College and Young Person's Theatre Company are also present.

2.1.13 There are two doctors' surgeries, four dentists and three hospitals; the Jules Thorn Day Hospital, Camden Community Trust Day Hospital and Camden Mews Day Hospital.

2.1.14 There are 10 religious facilities and/or places of worship, the nearest to the route being the Most Holy Trinity Church approximately 400m north.

2.1.15 There are also a number of important cultural facilities located close to the Proposed Scheme, such as the Roundhouse arts venue[6] on A502 Chalk Farm Road adjacent to the route.

Recreation, leisure and open space

2.1.16 The densely developed townscape[7] is dominated by rail and road infrastructure, with limited open space. The principal open space areas in the vicinity of the Proposed Scheme include Primrose Hill Park, Regent's Park, Camden Gardens, Bingfield Park and the linear open space associated with the Regent's Canal (see Maps CT-10-002 and CT-10-003b, Volume 2, CFA2 Map Book).

2.1.17 There are local play/recreation spaces at Camden Gardens, Camden Square Gardens, College Gardens, Elm Village and Juniper Crescent. Camden Lock and Regent's Canal also provide recreation space.

2.1.18 Talacre Community Sports Centre and Kentish Town Sports Centre are sports facilities in the area.

Policy and planning context

Planning framework

2.1.19 Given that HS2 is being developed on a national basis to meet a national need it is not included or referred to in many local plans. Nevertheless, in seeking to consider the Proposed Scheme in the local context, relevant local plan documents and policies have been considered in relation to environmental topics.

2.1.20 The majority of the Camden Town and HS1 Link area falls within the London Borough of Camden (LBC). There are also works in the London Borough of Islington (LBI), restricted to minor changes to an existing length of track (approximately 50m to the east of A5200 York Way). The London Plan[8] is the overall strategic plan for London. It sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031 and forms part of the development plan for

[6] The Roundhouse is locally known as the Roundhouse arts venue and the Roundhouse Theatre. For the remainder of the report, this facility will be referred to as the Roundhouse. It is immediately north of the route.
[7] Urban landscape.
[8] Mayor of London (2011), *The London Plan – Spatial Development Strategy for Greater London*, Greater London Authority (GLA).

Greater London. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

2.1.21 Relevant local planning policy documents include:

- London Borough of Camden Adopted Core Strategy (2010)[9];
- London Borough of Camden Adopted Development Management Policies (2010)[10];
- London Borough of Camden Site Allocations Local Development Document (2013)[11];
- London Borough of Islington Adopted Core Strategy (2011)[12];
- London Borough of Islington Finsbury Local Plan (2013)[13];
- London Borough of Islington Development Management Policies (2013)[14];
- London Borough of Islington: Local Plan Site Allocation (2013)[15]; and
- London Borough of Islington Submission Development Management Policies (2012)[16].

2.1.22 There are a number of key planning designations in the area, which include an air quality management area (AQMA)[17] and a number of listed buildings, conservation areas and protected viewpoints. Of particular note are the following conservation areas: Camden Broadway; Jeffrey's Street; and Regent's Canal. The Regent's Canal itself is part of the Canal Industries archaeological priority area. Camden Road Station is a Grade II listed structure. The Roundhouse and the Camden Incline Winding House are Grade II* listed. These are shown on Maps CT-10-002 and CT-10-003b (Volume 2, CFA2 Map Book).

2.1.23 There is one site at Camley Street with a statutory designation for nature conservation within 500m of the route (the Camley Street Nature Park Local Nature Reserve (LNR)). There are also three non-statutory sites for nature conservation (Local Wildlife Sites): the London Canals Site of Metropolitan Importance (SMI); Copenhagen Junction Site of Borough Importance Grade 1 (SBI.I); and North London Line Site of Borough Importance Grade 2 (SBI.II).

[9] London Borough of Camden (2010), *Adopted Core Strategy*.
[10] London Borough of Camden (2010), *Adopted Camden Development Polices*.
[11] London Borough of Camden (2013), *Site Allocations Local Development Document*.
[12] London Borough of Islington (2011), *Adopted Core Strategy*.
[13] London Borough of Islington (June 2013), *Finsbury Local Plan Part of Islington's Local Plan Area Action Plan for Bunhill and Clerkenwell*.
[14] London Borough of Islington (June 2013), *Development Management Policies*.
[15] London Borough of Islington (June 2013), *Islington's Local Plan: Site Allocations*.
[16] London Borough of Islington (2012), *Development Management Policies Submission Version*.
[17] See Map AQ-01-001, Volume 5, Air Quality Map Book.

2.1.24 Emerging policies are not generally considered within this report, unless a document has been submitted to the Secretary of State for approval. The North London Waste Plan is currently being prepared (jointly by LBC and six other boroughs in the North London Waste Authority area) and will also form part of the local development framework (LDF). However as it has yet to be adopted, it is not considered further in this report.

2.1.25 LBC is also currently looking to make amendments to its Camden Planning Guidance (CPG) document CPG2: Housing[18]. However, as it has yet to be adopted, it is not considered further in this report.

Committed development

2.1.26 Developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme, are shown on Maps CT-13-002 and CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book) and listed in Volume 5: Appendix CT-004-000/1 and CT-004-000/2. Except where noted, it has been assumed that these developments will have been completed by 2017. These are termed 'committed developments' and have been taken into account for the purpose of assessing the likely significant environmental effects of the Proposed Scheme. Where these developments have a particular relevance to an assessment topic, this is noted in the future baseline section for that topic.

2.1.27 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 Proposed Scheme, are termed 'proposed developments'. These are listed in Volume 5, Appendix CT-004-000. They are not included in the assessment.

2.1.28 There are three major developments in the area as shown on Maps CT-13-002 and CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book):

- CFA2/2- King's Cross and Pentonville Road: LBI allocation KC2 and related application P041261. This is a major mixed use redevelopment of part of the former railway lands to include residential, shopping, food and drink and professional services, leisure and community facilities, amenity and open space. This scheme is estimated to be developed between 2022 and 2026 and is a possible cumulative scheme with respect to HS2 which will be constructed between 2016 and 2026 i.e. there could be an overlap in the construction periods for both schemes;
- CFA 2/3 – King's Cross and Pentonville Road: LBI allocation KC4. This is a residential led mixed use redevelopment, including re-provision of business floorspace. A small element of other commercial uses could include retail and/or food and drink services. This scheme is estimated to be developed

[18] London Borough of Camden (2011), *Camden Planning Guidance (CPG) 2 – Housing.*

between 2017 and 2021 and it is assumed that there may still be some area of the allocation remaining to be built for residential development; and

- CFA2/22 – Hawley Wharf: LBC 2012/4628/P. This planning permission relates to the redevelopment of the site to create a mixed use development comprising eight new buildings between three and nine storeys in height to provide, employment, the relocated site for the expansion of Hawley Primary School (a new single form entry primary school and nursery), housing, cinema, retail market and produce market. The development is partially located within the land required for construction of the Proposed Scheme. Hs2 Ltd is currently in discussions with the developers of the Hawley Wharf scheme to allow both schemes to proceed.

2.1.29 The above major developments are considered likely to be constructed prior to, or during construction of HS2. They are considered to be receptors for the operation of HS2, but also potentially to give rise to cumulative construction impacts with the Proposed Scheme on their neighbours. They are referred to in those topic sections where such a cumulative impact has been identified.

2.2 Description of the Proposed Scheme

2.2.1 The following section describes the main features of the Proposed Scheme in the Camden Town and HS1 Link area (CFA2), including the main environmental mitigation measures. Further generic information on typical permanent features is provided in Volume 1, Section 5. Similarly, a general description of the approach to mitigation is set out in Volume 1, Section 9.

2.2.2 The Proposed Scheme will require some land on a permanent basis, key features of which are illustrated on Maps CT-06-003a, CT-06-004a and CT-06-143 (Volume 2, CFA2 Map Book). Land that will also be required, but only on a temporary basis for construction, is set out in Section 2.3.

2.2.3 In general, features are described from east to west along this section of the route.

2.2.4 Since the draft ES was published the following permanent features have been introduced to the Proposed Scheme:

- a new permanent footbridge will now be constructed over the MML to the north of the existing railway bridge over Camley Street; and
- a new NR equipment platform adjacent to the north side of the NLL Viaduct will now be installed and maintained from viaduct track level. Access for construction will be via the A5202 St Pancras Way and Wrotham Road.

Overview

2.2.5 The route of the Proposed Scheme through this area will be approximately 2.3km in length and will run on existing connected viaducts (the HS1 Viaduct, the NLL Viaduct, the Kentish Town Viaduct and the Chalk Farm Viaduct) that, with the exception of the

HS1 Viaduct, serve the London Overground (NLL) and freight services. The NR tracks which currently carry the NLL will be realigned on a disused track formation on the north side of the viaducts to allow HS2 services to pass along the southern side of the viaducts. Along the route in this section, there will be a number of partial/full bridge replacements and refurbishments to viaducts.

2.2.6 North of Juniper Crescent, the route will enter a new ramp constructed between the Morrisons supermarket access road bridge and a tunnel portal (tunnel entrance) approximately 100m east of Regent's Park Road Bridge[19]. The route will then proceed in a single bore tunnel into the Primrose Hill to Kilburn (Camden) (CFA3), where it will continue onto Old Oak Common running between the twin bore Euston Tunnel. The HS1-HS2 Link will connect to the new high speed lines at Old Oak Common Station.

2.2.7 The following sections provide further details of the proposed works.

York Way to Camley Street

2.2.8 The HS1-HS2 Link will commence to the east of A5200 York Way and west of the East Coast Main Line (ECML) (see Map CT-06-143, Volume 2, CFA2 Map Book). The HS1-HS2 Link single track will connect to the existing HS1 track between A5200 York Way and Camley Street. The HS1-HS2 Link will run on the existing HS1 Viaduct (a modern concrete structure) for approximately 700m. The existing viaduct runs in a south-westerly direction, rising to cross the eastbound HS1 track and the MML. The HS1-HS2 Link will then continue on the existing NLL Viaduct west of Camley Street. This section of viaduct is approximately 6m to 8m above the surrounding ground level. It is wide enough for four tracks but currently only carries two NR tracks on the southern side. The Proposed Scheme will comprise four tracks over the viaduct (three NR tracks and one HS1-HS2 Link track).

2.2.9 Key features of this section will include:

- demolition of 120 to 136 Camley Street to create a main construction compound with a ramp for access onto the existing NLL Viaduct;
- modification of and connection with the existing HS1 railway signalling and power and communications cabling and relocation of affected existing equipment;
- provision of a new HS1-HS2 Link track on the northern side of the HS1 Viaduct;
- installation of railway overhead line equipment (OLE), signalling and power supply equipment to serve the HS1-HS2 Link track;
- connection of the new tracks serving HS2 with the existing HS1 tracks (i.e. joining the tracks to create an integrated railway);

[19] This bridge is a road bridge which is closed to road traffic but open to pedestrians. It is the only road bridge over the railway in this part of the Proposed Scheme. The remaining bridges referred to are all railway bridges over roads.

- installation of two additional railway tracks to serve the NLL on the north side of the existing NLL Viaduct within the existing railway corridor between A5200 York Way and Camley Street. This will require the installation of replacement OLE, signalling and power supply modifications to serve the new and existing NLL tracks; and
- construction of a new footbridge over the MML to the north side of the existing bridge and the permanent re-routeing of the footpath from the existing railway bridge.

Camley Street to Camden Road Station (west end)

2.2.10 Continuing to the west for approximately 650m, the route of the Proposed Scheme will run along the south side of the existing NLL Viaduct to Camden Road Station. This viaduct consists of brick arches, with old metal girder bridges over roads. Historically, the viaduct carried four tracks but currently only has two tracks on the south side that are used by NLL passenger services and freight services. The north side of the viaduct is disused but contains various NR equipment boxes and cabling which will need to be moved prior to the commencement of the works The route continues through Camden Road Station (see Map CT-06-143, Volume 2, CFA2 Map Book) where only the southern half of the station (platforms 1 and 2) is currently in use. Platforms 3 and 4 are disused.

2.2.11 Key features of this section will include:

- relocation of NLL OLE, power supply signalling and communications equipment and associated cabling;
- replacement of the metal decks of the disused and operational bridges that cross A5202 St Pancras Way, Baynes Street and A503 Camden Road/Royal College Street and the demolition and replacement of Randolph Street Bridges;
- installation of two tracks on the disused track formation on the north side of the viaduct and the replacement of the existing NR track, providing a total of three tracks available for the NLL and freight services;
- installation of the new track to serve the HS1-HS2 Link (on the south side of the viaduct), which will be operated as a dedicated route for HS2 but limited to speeds of up to 65kph[20]. This will connect the HS1 track to the east of Camley Street to the HS1-HS2 Link tunnel portal at Primrose Hill;
- demolition of a building containing both commercial and residential uses at 110 Camden Road to the north and a commercial property at 178b Royal College Street to the south to accommodate the works on the bridges which form part of the NLL Viaduct at this location;

[20] In general the speed will be up to 50kph except where the trains approach and enter the tunnel portal.

- new bridge abutments (supports) under Randolph Street Bridge which will occupy the spaces currently used by commercial tenants;
- at Camden Road Station, after moving the NLL tracks northwards to platforms 3 and 4, platform 1 will be taken out of service and the canopy and platform will be altered to allow the wider and taller HS1-HS2 Link trains to pass through. Platform 2 will remain in use and platforms 3 and 4 will be reinstated to service the new NLL track alignment. Platforms 3 and 4 will be provided with new stairs and a lift. The disused entrance onto Royal College Street will be used in the event of an emergency but will not be open for general passenger use;
- installation of new walkways, for safety and maintenance access, fixed to the outside of the south and north sides of the viaduct at track level; and
- construction of an equipment platform, accessed from Wrotham Road, to support relocated NR equipment.

Camden Road Station to Morrisons supermarket access road

2.2.12 To the west of Camden Road Station, the high speed route will continue for approximately 600m on the southern side of the viaduct before passing onto the Chalk Farm Viaduct, towards the HS1-HS2 Link tunnel portal. The route will pass over the Camden Lock Village market area, Chalk Farm Road and the Stables Market, continuing over the access road to Morrisons supermarket (see Map CT-06-004a, Volume 2, CFA2 Map Book). This existing twin-track section of the route is currently used by freight services only. The NLL services use the north-western spur from the Kentish Town Road junction towards Gospel Oak (the Kentish Town Viaduct).

2.2.13 Key features of this section will include:

- rearrangement of the existing track and associated equipment at the junction between the west end of Camden Road Station and A400 Kentish Town Road. This is required in order to make connections to the new tracks through Camden Road Station (platforms 3 and 4) and to provide an additional track on the north side, on the existing Kentish Town Viaduct;
- relocation of NR OLE, power supply signalling and communications equipment and associated cabling;
- widening of the north side of the Kentish Town Viaduct by constructing a new tapered brick faced reinforced concrete viaduct parallel to 11 railway arches. The widened viaduct structure will mirror the existing arches and will include the spans over A400 Kentish Town Road and Torbay Street. This will require the demolition of a dental surgery at 51 Kentish Town Road (the Ivy House Dental Practice) with two residential dwellings above and two residential dwellings at 53 Kentish Town Road;

- installation of new walkways for safety and maintenance access, fixed to the outside of the south and north sides of the existing viaducts at track level, and removal of the existing parapets[21];
- replacement of the existing Chalk Farm Road Bridge with a wider bridge deck. Refurbishment and extension of the existing bridge supports, including diversion of utilities in the footpaths where these are directly impacted;
- installation of the two new tracks (i.e. one track for freight use and one dedicated to the HS1-HS2 Link) and associated equipment, along the Chalk Farm Viaduct; and
- modifications to the existing two NLL tracks, along the Kentish Town Viaduct.

Morrisons supermarket access road to Regent's Park Road Bridge

2.2.14 Continuing in a westerly direction for approximately 350m, the route will run on the Chalk Farm Viaduct over the access road to Morrisons supermarket and Juniper Crescent (see Map CT-06-004a, Volume 2, CFA2 Map Book). Continuing westwards, the route will continue along the southern side of an existing freight line and descend via a new ramp and portal (within a retaining structure), constructed between Juniper Crescent and the Roundhouse, towards the former Primrose Hill Station. It will then enter a new single bore tunnel approximately 100m to the east of the Regent's Park Road Bridge.

2.2.15 Key features of this section will include:

- the HS1-HS2 Link tunnel portal comprises an approximately 280m long approach ramp and approximately 70m cut-and-cover tunnel. The portal is the entrance to the HS1-HS2 Link tunnel;
- above the cut-and-cover section of the tunnel portal, a headhouse will be constructed for HS1-HS2 Link emergency intervention and evacuation and will contain mechanical and electrical equipment. It will be approximately 60m long by 20m wide and 4.5m in height (in relation to the current railway track level);
- demolition of the former Primrose Hill Station, which includes two commercial properties and a residential property facing on to Regent's Park Road;
- a new HS1-HS2 Link electricity substation, which will be constructed south-east of the former Primrose Hill Station;
- replacement of an existing NR electricity substation, south-east of the former Primrose Hill Station, to create room for the Proposed Scheme;
- demolition of approximately 100m of disused tunnel, the Up Empty Carriage Tunnel[22], as part of the works to construct the HS1- HS2 Link tunnel portal, to

[21] A parapet is a low protective wall or railing along the edge of the viaduct.

the east of Regent's Park Road Bridge. Sections of the Up Empty Carriage Tunnel, on either side of the demolished part, will be backfilled and sealed; and

- a permanent security fence around the tunnel portal headhouse site boundary.

2.2.16 The route will leave the Camden Town and HS1 Link area in a single bore tunnel and will continue to the west into the Primrose Hill to Kilburn (Camden) area (CFA3) for approximately 330m, at which point it will align with the Euston tunnel in the Adelaide Road area through to Old Oak Common.

2.3 Construction of the Proposed Scheme

2.3.1 This section sets out the strategy for the construction of the Proposed Scheme in the Camden Town and HS1 Link area including:

- an overview of the construction process;
- a description of the advance works;
- a description of the engineering works to build the HS1-Hs2 Link railway in conjunction with realigning and refurbishing the existing NR railway infrastructure;
- information on commissioning of the HS1-HS2 Link railway and recommissioning of the NLL; and
- an indicative construction programme (see Figure 6) and phasing (with particular reference to replacement of bridge decks and works on bridges requiring temporary road closures).

2.3.2 The assessment presented in this ES is based on the construction arrangements as described in this section.

2.3.3 In addition to the land that will be required permanently by the Proposed Scheme, land will be required on a temporary basis for construction. Key temporary construction features are illustrated on the construction Map Series CT-05 (Volume 2, CFA2 Map Book). Following construction works, land required temporarily will be prepared for its eventual end use, which will include being returned to its pre-construction use wherever appropriate.

2.3.4 A guide to standard construction techniques is provided in Volume 1, Section 6.4. In instances for which more than one possible construction technique might be possible, this section specifies which technique has been assumed for the purposes of the assessment.

[22] The Up Empty Carriage Tunnel connects with the Western Horse Tunnel and the Grade II* listed Camden Incline Winding Engine House vaults in the Gloucester Avenue area.

Overview of the construction process

2.3.5 Building and preparing the railway for operation will comprise the following general stages:

- advance works including: site investigations further to those already undertaken; preliminary mitigation works; preliminary enabling works;
- civil engineering works including: establishment of site construction compounds; site preparation and enabling works; main earthworks and structure works; site restoration; and removal of construction compounds;
- railway installation works, including: establishment of site construction compounds; railway infrastructure installation; fit out of the HS1-HS2 Link tunnel, tunnel portal and associated headhouse, connections to utilities; changes to the existing railway network; and, removal of site compounds; and
- railway testing and commissioning.

2.3.6 General provisions relating to the construction process are set out in more detail in Volume 1, Section 6.3 and the draft CoCP (see Volume 5: Appendix CT-003-000) including:

- the approach to environmental management during construction and the role of the Code of Construction Practice (draft CoCP, Section 2);
- working hours (draft CoCP, Section 5);
- the management of construction traffic (draft CoCP, Section 14); and
- the handling of construction materials (draft CoCP, Section 5).

Advance works

2.3.7 General information about advance works can be found in Volume 1, Section 6. Advance works will be required before commencing construction works and will typically include:

- further detailed site investigations and surveys;
- further detailed environmental surveys;
- advance mitigation works including, where appropriate, contamination remediation, temporary habitat creation and translocation, and archaeological field evaluation;
- land possession;
- site establishment with temporary fence construction; and
- utility diversions.

2.3.8 Advance works are programmed to take place during 2016.

HS1-HS2 Link construction phasing

2.3.9 The construction strategy for this section of the Proposed Scheme is proposed to be in five phases[23] – construction phases 0, 1, 2, 3 and 4. This is because the new HS1-HS2 Link track will be built along the line of an existing NR railway (the NLL), over bridges and existing viaducts through central Camden. Construction of the Proposed Scheme will need to maintain the existing railway in an operational state throughout the works with minimal disruption other than agreed closures (railway 'possessions' or 'blockades'). This is described in more detail in the following paragraphs and shown in the indicative construction programme, Figure 6.

Construction phasing

Phase 0 – civil engineering and NR systems modification and relocation works

2.3.10 This will involve the clearance of the northern half of the existing viaducts and bridges of all NR equipment/infrastructure and modification of the OLE accordingly. Works will be required to build a new electricity substation south-east of the former Primrose Hill Station and an equipment platform accessed at Wrotham Road. During this period, buildings will be demolished at 120 to 136 Camley Street to allow a temporary access ramp to be constructed and a new permanent footbridge will be constructed over the MML to the north of the existing bridge.

2.3.11 During this phase, a section of the Up Empty Carriage Tunnel will be demolished and infilled.

Phase 1 – civil engineering works

2.3.12 This will involve the refurbishment and/or widening of the viaduct and rebuilding of bridges along the north side of the existing NLL Viaduct. It will include the reinstatement of platforms 3 and 4 at Camden Road Station. Concurrently, the construction of the approach ramp to the HS1–HS2 Link tunnel portal will commence at the former Primrose Hill Station and structural widening on the north side of the Kentish Town Viaduct will also begin.

Phase 2 – existing railway modifications

2.3.13 Modifications to the existing railway will involve installing two new tracks (with associated railway equipment) from the east of York Way[24] to Kentish Town Viaduct. Once complete, the NLL services will then be switched onto these new tracks.

2.3.14 Concurrently with the phase 2 track installation works, the phase 1 civil works will continue including the below ground structures associated with the HS1–HS2 Link

[23] These are construction phases specific to this section of the Proposed Scheme.
[24] Installation of a second track to serve the HS1-HS2 Link adjacent to the HS1 track on existing viaducts to the east of A5200York Way and between A5200York Way and a point to the west of Camley Street.

tunnel portal, ramp and a tunnel boring machine (TBM) reception chamber. Towards the latter part of this phase, the bridge over A502 Chalk Farm Road will be demolished and rebuilt during a 10 to 14 day closure of the NR tracks serving the NLL and freight services (this would require working over 24 hour periods) and a three week road closure.

Phase 3 – civil engineering works

2.3.15 These works will involve refurbishing the viaduct and reconstructing the bridges along the southern half of the viaducts, including removal of brick parapets and the installation of steel walkways with solid parapets. In addition, the HS1–HS2 Link tunnel portal and ramp will be nearing completion in preparation for the receipt of the TBM which will be driven from Old Oak Common (in the Kilburn (Brent) to Old Oak Common area (CFA4)) to form the HS1-HS2 Link tunnel.

Phase 4 – HS1-HS2 Link installation works and modifications to the existing railway

2.3.16 These works will be undertaken along the southern side of the refurbished viaduct, over the new bridges and through the southern half of Camden Road Station. On completion of these works, testing and commissioning will be undertaken (including the OLE, communications, power and signalling initially for one re-built NR track and, in due course, for the HS1-HS2 Link track). Commissioning is described in more detail in Volume 1, Section 6.26.

Construction traffic routes and management of road closures

2.3.17 The movement of construction vehicles carrying materials, plant, other equipment and workforce (or moving empty) will take place both within the construction sites, on public roads and via the rail network. The construction compounds will provide the interface between the construction works and the public highway or rail network, and the likely road routes to access compounds are described in subsequent sections.

2.3.18 Bridge replacement and refurbishment will initially be carried out at bridges crossed by the Proposed Scheme on the northern side of the viaducts during phase 1 of the construction process and then again on the southern side of the viaduct at the same locations during phase 3. There will be a gap of approximately one year between these phases and works on individual bridges will be sequential (i.e. no more than one bridge requiring a road closure will be worked on simultaneously).

2.3.19 Further information relating to road closures and the requirement for provision of temporary alternative footpaths, durations and alternative diversion routes is provided in the information below in relation to each construction compound and in Section 12 of this report.

General overview of construction compounds

2.3.20 Works will be coordinated from two main construction site compounds, the Camley Street main compound (in the east) and the HS1-HS2 Link portal main compound (in the west). These main site compounds will be supported, in most cases, by satellite site compounds comprised of small offices and welfare units (on the viaduct, next to the bridges or viaduct works). At some satellite compounds where space is limited, for example at certain bridges, the satellite compound may only have small mobile office/welfare units.

2.3.21 Main compounds will be used for core project management staff (i.e. engineering, planning and construction delivery), and commercial and administrative staff. These management teams will directly manage some works and/or coordinate satellite compounds, which will manage other works. In general, main compounds will contain:

- space for the storage of bulk materials (aggregates, structural steel and steel reinforcement);
- space for the receipt, storage and loading/unloading of excavated material either onto or off the site;
- a small area for the fabrication[25] of minor temporary works, equipment and storage of finished goods;
- fuel storage (for day to day needs only);
- small plant and equipment storage;
- office space for management staff, limited car parking for staff and site operatives, and welfare facilities;
- welfare facilities but no worker accommodation; and
- operational parking for loading and unloading and for standing mobile cranes during bridge demolition and reconstruction.

2.3.22 Main compounds will also be used by contractors undertaking HS1-HS2 Link railway installation works and modifications to the existing railway.

2.3.23 Satellite compounds will be used as the base to manage specific works along a section of the route. They will usually provide office accommodation for limited numbers of staff, local storage for plant and materials, limited car parking for staff and site operatives, and welfare facilities.

2.3.24 In this part of the Proposed Scheme, materials generated during demolition, excavation of the tunnel portal ramp and portal structures, clearance of areas for compounds and redundant track ballast, will generally be removed from site by road,

[25] Most of the prefabrication will be carried out off-site due to lack of space in this urban area.

as and where they arise. It may be necessary to use areas adjacent to the construction activity to temporarily store such materials pending off-site disposal as waste or recyclable materials.

2.3.25 General provisions 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 6.3, and the draft CoCP, Section 5.

2.3.26 As illustrated in Figure 3, Figure 4 and Figure 5, in the Camden Town and HS1 Link area there will be two main compounds and 13 small satellite compounds which will be used to support and manage the civil engineering or rail system works. Compounds that will support construction in the Camden Town and HS1 Link area but which are located in other sections of the Proposed Scheme are also included.

Figure 3: Schematic of site compounds for civil engineering works (Part 1)

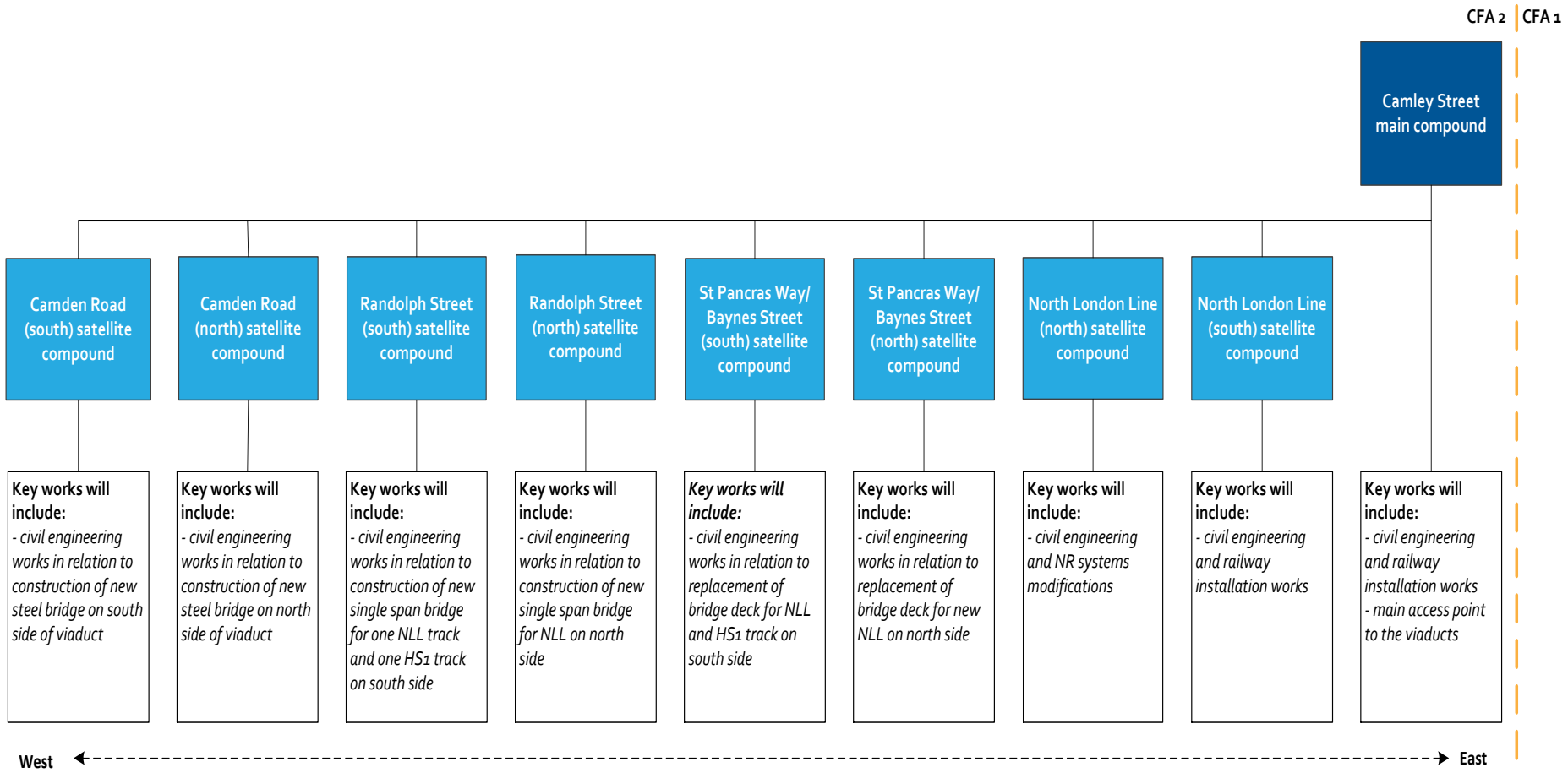


Figure 4: Schematic of site compounds for civil engineering works (Part 2)

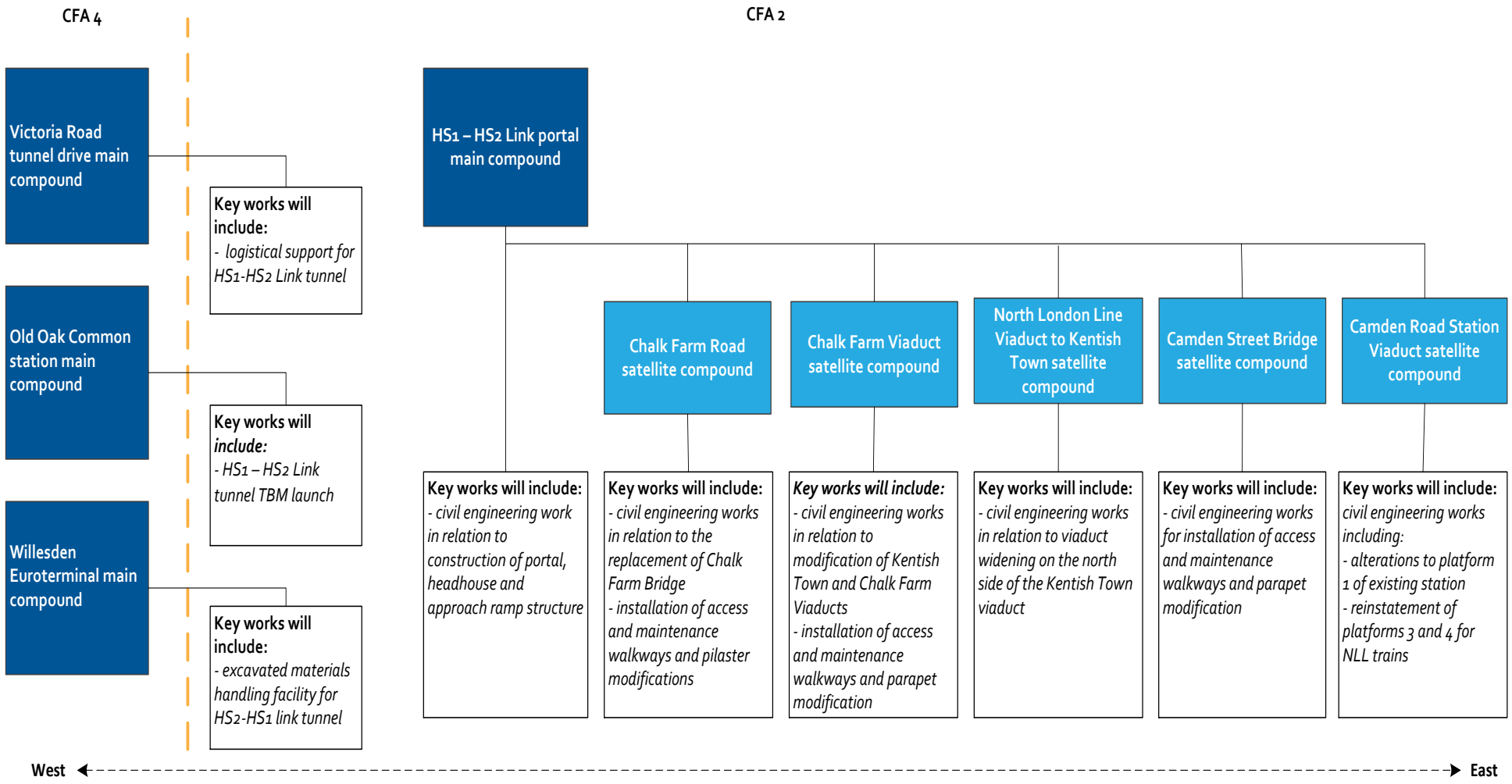
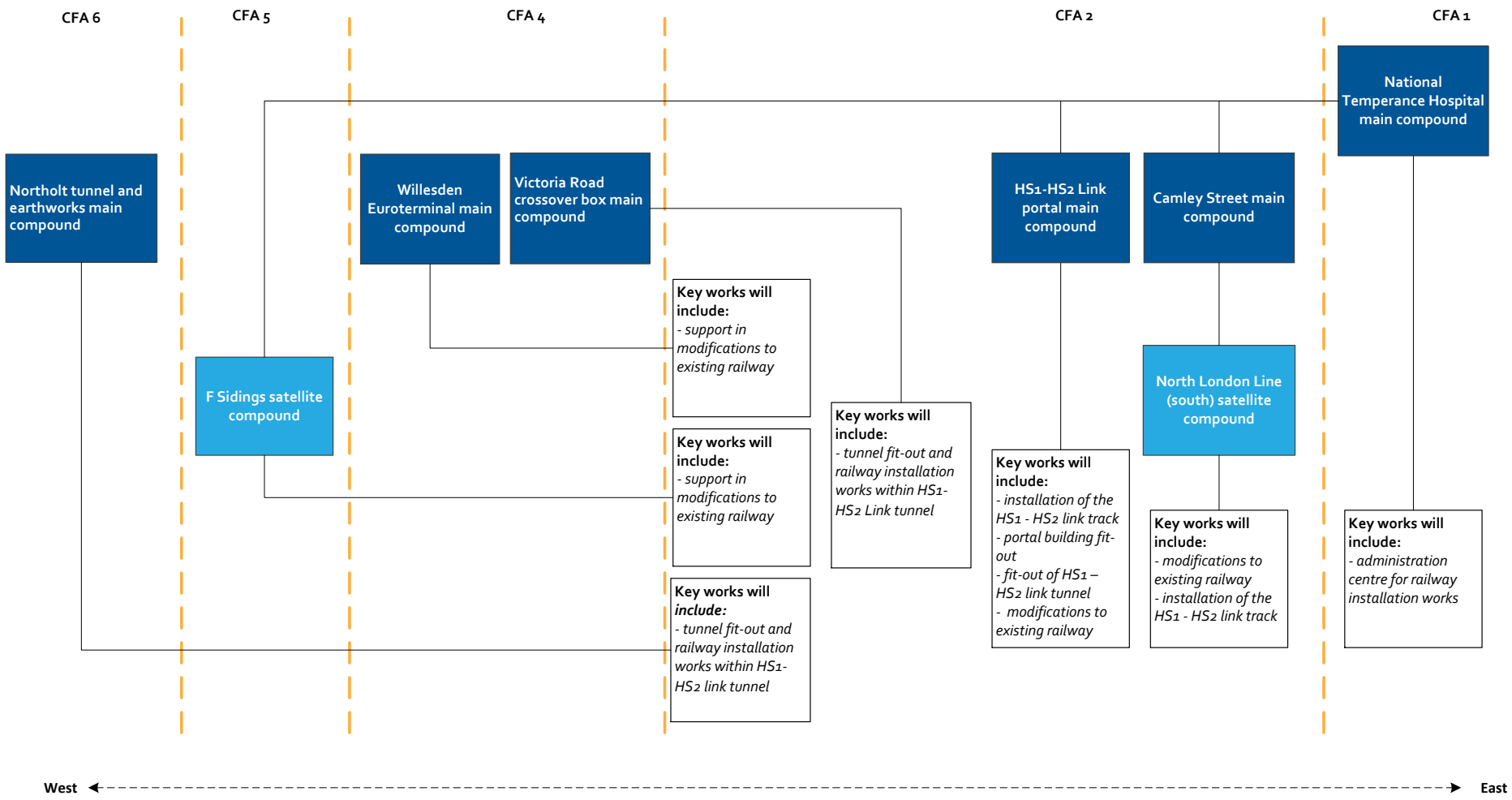


Figure 5: Rail systems compounds



Camley Street main compound

2.3.27 This compound will be used for civil engineering and railway installation works and works to the existing railway network, between A5200 York Way and the HS1-HS2 Link tunnel portal. It will also support works to the Kentish Town Viaduct to the west of Camden Road Station (for NLL reconstruction). The compound will be operational for approximately seven years[26] as follows:

- in phase 0, starting in 2017, it will support one year of enabling works, which will include demolition of existing buildings, site clearance to establish the compound, realignment of an existing public footpath and construction of a new footbridge over the MML[27], construction of an access ramp between the compound and the top of the NLL Viaduct and relocation of railway line side equipment;
- in phase 1, it will support civil engineering works on the northern side of the NLL Viaduct between Camley Street and Camden Road Station, for approximately two years;
- in phase 2, it will support works comprising the installation of approximately 1.5km of track and rail infrastructure from Camley Street to the widened Kentish Town Viaduct and modifications to the existing railway (on the northern side of the viaducts and bridges), for approximately two years; and
- during phase 3 (two years) and phase 4 (six months), the offices will provide support to activities that will be managed from the North London Line (south) satellite compound.

2.3.28 The compound will:

- support up to 50 workers each day throughout the phase 1 civil engineering works period which occur along the viaduct and support approximately 70 workers each day throughout the railway infrastructure installations works and existing railway modifications;
- be used for railway installation works, which will be managed from the National Temperance Hospital main compound, in the Euston Station and Approach area (CFA1);
- be used to support work required to take place at night, weekends or during bank holidays; and
- be accessed from the south via Camley Street, a minor road which connects to the A5202 Pancras Road.

2.3.29 Key railway installation works and works to the railway network in this section of the Proposed Scheme will comprise:

[26] Whilst these phases are generally discrete periods, there may be some overlap between phases.
[27] This will involve a permanent realignment of a section the footpath from Maiden Lane Estate to Camley Street. The permanent diversion of the footpath runs from the MML bridge to Camley Street 130m to the north of the existing path.

- modification to the existing NR railway track and associated equipment (in phases 0,2 and 4); and
- installation of the HS1-HS2 Link track and associated equipment (in phase 4).

2.3.30 Prior to phase 1, demolition of commercial premises at 120 to 136 Camley Street, to clear the area for the construction compound, will be necessary.

2.3.31 There are no major utility diversions required as a result of the HS1-HS2 Link works.

North London Line north satellite compound

2.3.32 This compound is on the elevated NLL Viaduct and will be used for civil engineering works and NR systems modifications prior to the phase 1 civil works. The compound will:

- be used in phase 0 for enabling works, starting in 2018 for approximately nine months, for the relocation of NR line-side equipment and the construction of a new NR line side substation close to Camley Street Bridge/work site;
- be used by the HS1-HS2 Link civil engineering contractor to install a platform on the north side of the viaduct, accessed from Wrotham Road, to receive new and relocated NR line-side equipment. It will then be used for access along the northern side of the viaduct to service phase 0 and phase 1 civil engineering works and phase 2 track and systems installation works by staff based at Camley Street main compound;
- receive two new NR tracks to be installed in phase 2 on the northern side of the NLL Viaduct;
- be operational periodically in phases 0, 2 and 4, starting in 2018;
- support up to 40 workers each day throughout the civil engineering works and railway infrastructure installation period;
- be accessed from Camley Street and Wrotham Road; and
- be used for work required to take place at night, weekends or during bank holidays, as well as core hours.

2.3.33 Access to construct a new NR equipment platform adjacent to the north side of the NLL Viaduct will be required via the A5202 St Pancras Way and Wrotham Road for approximately four months. The platform will have a footprint of approximately 5m by 40m but will be elevated and positioned at the viaduct track level. The NR equipment will be installed and maintained from viaduct track level.

2.3.34 There will be no demolitions or commercial access restrictions associated with construction managed from this compound. There will be the relocation of two NR relocatable equipment buildings.

2.3.35 As the site is on an elevated viaduct, there will be minimal impact on traffic or pedestrians.

2.3.36 There are no major utility diversions required as a result of the HS1-HS2 Link works.

North London Line south satellite compound

2.3.37 This compound will be used for civil engineering and railway installation works, between York Way and Camden Road Station for the HS1-HS2 Link and realigned NLL tracks. The compound will:

- be operational for approximately two years in two phases between 2021 and 2024 for both civil and railway installation works;
- support up to 40 workers each day for civil engineering works and support approximately 20 workers each day throughout the rail systems installations works period;
- be used during railway installation works, which are managed from National Temperance Hospital main compound in the Euston Station and Approach area (CFA1);
- be used for work required to take place at night, weekends or during bank holidays; and
- be located in an existing NR track maintenance depot which is accessed via a gated entrance from the Cedar Way and Camley Street.

2.3.38 Key railway installation works and works to the existing network in this section of the Proposed Scheme will be:

- the HS1-HS2 Link railway installation works, comprising a single track with associated railway infrastructure works; and
- modification to the existing railway track and associated infrastructure.

2.3.39 There will be no demolitions or commercial access restrictions associated with construction managed from this compound.

2.3.40 There are no known major utility diversions required as a result of the HS1-HS2 Link works.

St Pancras Way/Baynes Street (north) and (south) satellite compounds

2.3.41 These compounds will be used (separately) for civil engineering works to the St Pancras Way and Baynes Street Bridges (in phases 1 and 3). The compounds will:

- be operational at north and south bridge locations, for civil engineering works to the bridge structures starting in 2017, phase 1 (north side), and 2021 phase 3 (south side);
- support up to 40 workers during railway bridge deck demolition over a period of about four weeks;
- support approximately 16 workers each day for abutment repairs for three to six months (subject to detailed survey);

- support up to 40 workers for about one week during new bridge deck installation;
- be used for work required to take place at night, weekends or during bank holidays during NR track possessions for lifting bridge components next to the NLL operating railway; and
- be accessed via the A5202 St Pancras Way and Baynes Street.

2.3.42 There will be no demolitions associated with the works managed from this compound. The commercial premises at 90 to 94 Baynes Street will be inaccessible for 10 months in phase 3.

2.3.43 A road closure on A5202 St Pancras Road/Baynes Street of less than four weeks will be required for installation of a scaffold support system and for bridge deck demolition. About three to six months later, the road will be closed for about one week for installation of the new bridge deck.

2.3.44 Permanent realignment of (or local protection measures to) three Thames Water mains may be required. If such realignments are required then suitable/appropriate temporary footpath and road closures will be implemented.

2.3.45 The bridge on the north side of the viaduct is a single structural unit, with a central pier, which spans both the A5202 St Pancras Way and Baynes Street. The bridge replacement works in phase 1 will therefore be carried out over both roads simultaneously.

2.3.46 The two bridges on the south side of the viaduct spanning over A5202 St Pancras Way and over Baynes Street are separate structures, therefore works in phase 3 will be carried out as two separate, staggered, work elements to the south side of these bridges to minimise traffic disruption.

Randolph Street (north) and (south) satellite compounds

2.3.47 These compounds will be used for civil engineering works to the Randolph Street Bridge. The two existing NR bridges over Randolph Street are both three span iron bridges with two abutments and two rows of intermediate iron columns. The bridge on the northern half of the viaduct will be demolished and replaced by a two span steel bridge in phase 1 starting in 2018. The bridge on the southern side of the viaduct will be demolished and replaced in phase 3 in 2021, after the NLL has been moved onto the new northern alignment in 2020. These existing three span bridges have cast iron columns, which will be removed and the replacement bridge will be a simple one span structure with concrete supports. The compounds will:

- be operational at north and south bridge locations each for up to a year for civil engineering works to the bridge structures starting in 2018 (phase 1 – north side) and 2021 (phase 3 – south side);
- support up to 40 workers each day;

- be used for work required mainly during the daytime but may also take place at night, weekends or during bank holidays during NR track possessions for lifting bridge components next to the operational railway; and
- be accessed via the A5202 St Pancras Way and Randolph Street.

2.3.48 There will be no demolitions associated with construction managed from this compound. The commercial premises on the northern side of the NLL Viaduct, arches at 77 to 79 Randolph Street and an arch at 88 Randolph Street, will be inaccessible for approximately 10 months in phase 1. The commercial premises on the southern side of the NLL Viaduct, an arch at 78 Randolph Street, will be inaccessible for approximately 10 months in phase 3.

2.3.49 During the road closure on Randolph Street, alternative road and pedestrian routes will be required. The existing iron bridge has three spans sitting on iron columns and will be replaced by a new steel bridge deck with a single span on new piled foundations and walls (abutments). To demolish the existing bridge and remove the redundant foundations, the road will be fully closed for up to three months, followed by a period of partial closure of up to three months, with one way traffic controlled single lane working. An additional two month provisional allowance will be made for dealing with potential utility diversions. At the end of this period the road will be fully closed for about one week while the new steel bridge deck is installed. This pattern of working and road closures is repeated in phase three for the south half of the bridge about two years later. Further details are provided in Section 12.

2.3.50 Permanent realignment of a Thames Water main will be required and the extent of other utility works (if any) will be established during site investigations which will be carried out in a six month period prior to the commencement of the bridge refurbishment and replacement works.

Camden Road (north) and (south) satellite compounds

2.3.51 These compounds will be used for civil engineering, at the A503 Camden Road/Royal College Street Bridge. The compounds will:

- be operational at north and south bridge locations each for approximately nine months for civil engineering works to the bridge structures starting in 2018 (phase 1 – north side) and 2022 (phase 3 – south side);
- be used for the construction of the replacement of the intermediate column and the new piled foundations may require local pedestrian diversions;
- support up to 40 workers each day/night;
- be used for work required to take place at night, weekends or during bank holidays within NR track possessions to allow lifting bridge components to operate close to the adjacent railway; and
- be accessed from Royal College Street and A503 Camden Road.

2.3.52 Demolition of two buildings will be required (for bridge replacement):

- 178b Royal College Street, a commercial premises; and
- 110 Camden Road, a commercial premise with a dwelling above.

2.3.53 The commercial premise at 47 to 49 Camden Road (a restaurant) will be inaccessible for five weeks in phase 3.

2.3.54 Alternative highway and pedestrians routes will be required during a closure of Camden Road and Royal College Street for two roads and two footpaths to accommodate the following construction activities and road closures:

- prior to bridge demolition, the brick pilasters at the corners of the bridge will be removed. Scaffolding will occupy the footpaths for about four weeks at each pilaster with alternative local footpaths in place;
- this will be followed by approximately road closures of less than four weeks, in phases 1 and 3, for removal of each half of the bridge. It is necessary to install a scaffold support system below the existing bridge deck, to allow it to be cut into numerous sections, weighing up to 15 tonnes each, to be taken away for recycling. The support system is then removed and the road reopened;
- footpaths will remain occupied (alternately) by construction activities to carry out repairs to the brick abutments during the next three to four months while the new steel bridge is fabricated off site. Alternative local footpath routes will be implemented;
- on the north side of the north bridge, while the abutments are being repaired, the existing mid-span iron column will be removed and replaced by a new foundation and a new concrete column (resistant to vehicle impact);
- after the abutment and column work is completed, the road will again be closed for about one week while the new steel bridge components are delivered and erected with a large mobile crane. This work will require track possessions of the adjacent operating railway;
- after installing the new steel bridge components, the footpaths will again be occupied by scaffolding in order to reconstruct the brick pilasters and capping stones; and
- provision of alternative routes for traffic or pedestrians may also be required (subject to detailed surveys) during the utility diversions listed in the following paragraph.

2.3.55 Permanent realignment of four Thames Water mains may be required. If such realignments are required then suitable/appropriate temporary footpath and road closures will be implemented.

2.3.56 For the southern bridge replacement, the use of these compounds in phase 3 will be approached in a similar manner as that described above, although the southern bridge

has a shorter span and there is no central iron column to be replaced, so there will be a reduced scope of work. The pilaster replacements and repairs to the abutments will be similar to the north bridge. In phase 4, the NR and HS1-HS2 Link track and systems will be installed across the bridge as described previously.

Camden Road Station viaduct satellite compound

2.3.57 This compound will be used for civil engineering works at Camden Road Station, and provide access for the track and systems installation within the station and viaduct. The compound will:

- be operational, periodically, within a period of four years for civil engineering and railway installation works, starting in 2018;
- support up to 40 workers each day (or night), at ground level or on the station viaduct, for civil engineering works, in phases 1 and 3, and support up to 40 workers on top of the viaduct, each day/night for intermittent periods throughout the phase 2 and 4 rail systems installations works period;
- be used for work required to take place mainly during the day but occasionally may take place at night, weekends or during bank holidays during NR track and station possessions; and
- be accessed, for civil works, from the Royal College Street and A503 Camden Road (including pedestrian access through the existing NR station ticket hall) with occasional access (to deliver materials and plant by crane) via ground level sites next to Ivor Street and Prowse Place, and for track and ballast installations, mainly accessed along the viaduct.

2.3.58 Key works at this location will be:

- refurbishment of the north side of the station and reinstatement of platforms 3 and 4, including reopening the disused subway and installation of a new canopy, stairs and a lift to platform 4 (phase 1);
- relaying of tracks to serve the NLL and platforms 3 and 4 (phase 2);
- installation of new HS1-HS2 Link track adjacent to platform 1 (phase 4);
- altered canopy and platform and closure of public access to platform 1 (phase 3); and
- commissioning of HS1-HS2 Link track (in phase 4).

2.3.59 There will be no demolitions associated with construction managed from this compound. The commercial premises at 3a Prowse Place and 160 Camden Street will be inaccessible for three years.

2.3.60 There are no known major utility diversions required as a result of the HS1-HS2 Link works.

Camden Street Bridge satellite compound

2.3.61 This compound will be used for civil engineering on the bridge and will be accessed from A400 Camden Street.

2.3.62 This is a very small, 4m wide, strip of land within the northern half of Camden Gardens, adjacent to the viaduct, which will:

- be operational periodically for approximately one year for minor civil engineering works to the bridge structure (modification of the north and south parapets), delivery of materials and installation of access and maintenance walkways starting in 2018;
- support approximately 40 workers each day periodically;
- be used for work required to take place at night, weekends or during bank holidays to utilise NR track possessions; and
- be accessed, from both sides of the viaduct, via temporary stairs and a scaffolding platform within a lockable hoarding next to the viaduct.

2.3.63 Temporary partial closure of A400 Camden Street and its footpath may be required on occasions for periods of typically 24 hours within a 12 week period, when a mobile crane will occupy the road, usually at night or at weekends to accommodate NR track possessions.

2.3.64 One NR equipment building will be decommissioned and one NR relocatable equipment building will be moved to the platform of Camden Road Station.

North London Line Viaduct to Kentish Town satellite compound

2.3.65 This compound will be used for civil engineering works during the widening on the north side of the NLL Kentish Town Viaduct for an approximate 130m section to the west of A400 Kentish Town Road. This will include installation of new bridge foundations on the west side of the road, including the span over A400 Kentish Town Road and construction of a new arch over the north side of the viaduct at A400 Kentish Town Road[28].

2.3.66 The compound will:

- be operational for a period of approximately one year during 2018 and 2019 and nine months during 2021 for civil engineering works to the viaduct and associated bridge structures as well as the installation of new access and maintenance walkways (following the removal of the existing brick parapets) all in phase 1, starting in 2018;
- support up to 65 workers each day;

[28] For the purposes of this ES, it has been assumed that the Hawley Wharf development will be completed prior to the commencement of construction of Proposed Scheme and that certain buildings/structures will have been demolished as part of the Hawley Wharf development.

- be used for work required to take place at night, weekends or during bank holidays to utilise NR track possessions; and
- be accessed from the A400 Kentish Town Road and Torbay Street.

2.3.67 Demolitions will be required at the following properties:

- 51 Kentish Town Road comprised of a dental surgery (the Ivy House Dental Practice) with two residential dwellings above;
- two residential dwellings at 53 and 53A Kentish Town Road; and
- a residential block, containing approximately 40 dwellings, at Hawley Wharf.

2.3.68 The commercial premises at arches 1 to 7, and 49 Kentish Town Road will be inaccessible for up to three and a half years.

2.3.69 Partial closures of A400 Kentish Town Road, with one way traffic control, will be required for approximately two months during which pedestrian access will be maintained on one side of the road. A full closure of A400 Kentish Town Road will also be required for approximately 12 hours during a NR track possession at night/weekend to install the concrete arch span units.

2.3.70 Partial closures of Torbay Street to Leybourne Road (arch 6), with one way traffic control, will be required for approximately two months during which pedestrian access will be maintained on one side of the road. A full closure of this road will also be required for approximately 12 hours during a NR track possession at night/weekend to install the concrete arch span units.

2.3.71 Permanent realignment of two Thames Water mains and two National Grid gas mains utilities may be required.

Chalk Farm Viaduct satellite compound

2.3.72 This compound will be used for civil engineering works associated with modification of the Kentish Town and Chalk Farm viaducts involving the removal of brick parapets, installation of access and maintenance walkways, new OLE supports and solid parapets.

2.3.73 The compound will:

- be operational for approximately six months for civil engineering works to the bridge structures (parapet replacement and widening) starting in 2018;
- support up to 40 workers each day;
- be used for work required to take place at night, weekends or during bank holidays to accommodate working in NR track possessions; and
- be accessed from ground level via scaffolding erected in 30m sections in Camden Lock Village Market (south of the viaduct), and by the use of mobile elevated work platforms.

2.3.74 The commercial premises within arches 1-16 of the Chalk Farm Viaduct within Camden Village Market will be inaccessible for four weeks per unit.

2.3.75 Diversions via A502 Hawley Road will be required during the closure of Torbay Street and via Camden Gardens and A400 Camden Street for the closure of A400 Kentish Town Road.

Chalk Farm Road satellite compound

2.3.76 This compound will be used for civil engineering works for the replacement of Chalk Farm Road Bridge. The compound will:

- be operational periodically between 2018 and 2022 for civil engineering works to the Chalk Farm Road bridge structure in a single phase starting at the end of phase 2 in December 2020 and continuing over the Christmas/New Year period and for works to the associated viaduct;
- support (periodically) up to 70 workers each day;
- be used for installing new piled foundations for widening the southern abutments, and for the removal and reinstatement of brick pilasters at the four corners of the bridge and associated capping stones;
- relocation of NR OLE, power supply signalling and communications equipment and associated cabling;
- be used for removal and replacement of the bridge deck during a 10 to 14 day closure of the NR tracks serving the NLL and freight services (this would require working over a 24 hour period) and a three week road closure; and
- be accessed from the A502 Chalk Farm Road.

2.3.77 There will be no building demolitions associated with construction managed from this compound.

2.3.78 The commercial premises within arches 1-4 within Camden Stables Market[29] will be inaccessible for approximately three weeks per arch.

2.3.79 Diversion of traffic on A502 Chalk Farm Road will be required during bridge demolition and installation of the new bridge over a period of less than four weeks. The diversion will be via the A400 Kentish Town Road, Prince of Wales Road and A502 Haverstock Hill. Buses will be rerouted via the A400 Kentish Town Road, Prince of Wales Road and Harmood Street.

2.3.80 Pedestrian diversions will be required for the full closure period of up to four weeks, via Hawley Crescent, A400 Kentish Town Road, A502 Hawley Road and Hawley Street. During abutment underpinning and widening, removal and replacement of brick pilasters, and during refurbishment work, local pedestrian diversions will be

[29] Also known as the Camden Goods Arches.

provided over a period of about four months before bridge demolition and two months after the installation of the new bridge.

2.3.81 Permanent realignment of a Thames Water sewer, a Thames Water main and two National Grid gas mains will be required.

2.3.82 The programme and durations for the civil works described above does not include any periods for potential utility realignments.

HS1-HS2 Link portal main compound

2.3.83 This compound will be used for the construction of the HS1–HS2 Link tunnel portal comprising the portal box and headhouse and the 280metre long approach ramp retaining structure. Typical construction methodology for the portal is described in Volume 1, Section 6.13. The portal structure will also be used for the reception of the HS1-HS2 Link tunnel TBM driven from Old Oak Common (in CFA4). It will provide support for the reconstruction of the Chalk Farm Road Bridge and for the viaduct refurbishment eastwards towards Camden Road Station. It will also be used for railway installation works and modifications to the existing railway and will:

- be operational intermittently for approximately seven years (2017 to 2023) for the civil engineering works to the portal and ramp structure, including temporary diversion and permanent modifications to the existing railway and railway installation and fit out within the HS1-HS2 Link tunnel;
- support a civil works team of up to 65 workers and staff, followed periodically by a team of up to 40 workers each day throughout the railway installation works period;
- be used for railway installation works, which will be managed from National Temperance Hospital main compound, in the Euston Station and Approach area (CFA1);
- provide access/egress to the NR access strip parallel to the WCML; and
- be accessed by road, via Juniper Crescent and the Morrisons supermarket access road, from A502 Chalk Farm Road.

2.3.84 Key railway installation works in this section of the Proposed Scheme will be:

- the HS1-HS2 Link railway works, comprising track, OLE, communications equipment and traction power supply. The HS1-HS2 Link track is of standard ballasted track configuration, comprising principally of ballast, rail and sleepers in an open section of the route. Slab track will be installed within the tunnel;
- fit out of HS1-HS2 Link tunnel portal headhouse building;
- fit out of HS1-HS2 Link tunnel; and
- modifications to existing railway infrastructure.

2.3.85 Demolitions will be required for works associated with this compound as follows:

- a section of the disused Up Empty Carriage Tunnel will be removed in connection with the construction of the portal;
- an existing NR electricity substation will need to be removed and replaced with a new substation to the south of the portal; and
- the former Primrose Hill Station, incorporating 200 Regent's Park Road which consists of two commercial premises and a residential dwelling.

2.3.86 Partial closure of the western end of the access road to Juniper Crescent for up to three months will be required for the widening of the south side of the road and the construction of the new acoustic barriers. Access to properties will be maintained.

2.3.87 The NR high voltage electricity cables currently located within the Up Empty Carriage Tunnel will be relocated along a surface route within the railway corridor.

2.3.88 Access for early phases of the tunnel portal ramp construction work, and construction of the permanent reinstated NR track alignment, will be from A502 Chalk Farm Road, through the car park to the west of the Roundhouse.

National Temperance Hospital main compound

2.3.89 This compound is located in Euston Station and Approach area (CFA1) and will provide administrative and site management support to the railway installation works within this section of the Proposed Scheme. See Volume 2, CFA Report 1, Euston Station and Approach area (CFA 1 Report) report for more information about this compound.

Willesden Euroterminal main compound

2.3.90 This compound is within Kilburn (Brent) to Old Oak Common area (CFA4), but it will be used to support modifications to the existing railway within the Camden Town and HS1 Link area. See the Volume 2, CFA Report 4, Kilburn (Brent) to Old Oak Common area (CFA4 Report) report for more information about the compound.

F Sidings satellite compound

2.3.91 This compound is within Northolt Corridor area (CFA5), but it will be used to support modifications to the existing railway within the Camden Town and HS1 Link area. See the Volume 2, CFA Report 5, Northolt Corridor area (CFA5 Report) report for more information about the compound.

Main compounds to support tunnel construction

2.3.92 The following main compounds in the Kilburn (Brent) to Old Oak Common area (CFA4) will support tunnel construction through the Camden Town and HS1 Link area[30]:

[30] For further details on these compounds, please refer to CFA Report 4.

- the Old Oak Common Station main compound will be used for the launch and initial logistical support of the TBM used to construct the HS1-HS2 Link and the Euston tunnels;
- the Victoria Road tunnel drive main compound will be used for the logistical support of the TBM used to construct the HS1-HS2 Link and Euston tunnels; and
- the Victoria Road crossover box main compound will be used for the launch and logistical support of the TBM used to construct the Northolt tunnel and for the railway installation works and tunnel fit out within the HS1-HS2 Link and Euston tunnels.

Northolt tunnel and earthworks main compound

2.3.93 This compound is located in the South Ruislip to Ickenham area (CFA6) and will provide support for railway installation works within the Euston and HS1-HS2 Link tunnels. The railway installation works will include track, OLE, communications equipment and traction power supply. The installation of track within the tunnels will be concrete slab track. This compound, containing the West Ruislip railhead, will also support the fit out of the Euston and HS1-HS2 Link tunnels[31].

Construction waste and material resources

2.3.94 Forecasts of the amount of construction, demolition and excavation waste (CDEW) and worker accommodation site waste that will be produced during the construction of the Proposed Scheme in the Camden Town and HS1 Link area have been prepared and are presented in Volume 5: Appendix WM-001-000.

2.3.95 The majority of excavated material that will be generated across the Proposed Scheme will be re-used as engineering fill material or in the environmental mitigation earthworks of the Proposed Scheme, either with or without treatment.

2.3.96 Based on the mitigation earthworks design approach adopted for the Proposed Scheme, local excess or shortfall of excavated material within the Camden Town and HS1 Link area will be managed with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material is presented in Volume 3, Section 14.

2.3.97 The quantity of surplus excavated material originating from the Camden Town and HS1 Link area that will require off-site disposal to landfill as excavation waste is shown in Table 1. This is the forecast quantity of contaminated excavated material that is chemically unsuitable for re-use within the Proposed Scheme and which will be taken directly from the Camden Town and HS1 Link area for off-site disposal to either non-hazardous or hazardous landfill. This represents a proportion of the total quantity of

[31] See Volume 2, CFA Report 6, South Ruislip to Ickenham (CFA Report 6) for more information about this compound and for details of railway installation works via the West Ruislip railhead.

surplus excavated material that will require disposal which altogether is reported on a route-wide basis in Volume 3, Section 14.

2.3.98 The quantities of demolition, construction and worker accommodation site waste that will be re-used, recycled and recovered (i.e. diverted from landfill) have been based on the performance of similar projects as follows:

- demolition waste: 90%;
- construction waste: 90%; and
- worker accommodation site waste: 50%.

2.3.99 The quantities of demolition, construction and worker accommodation site waste that will require off-site disposal to landfill are shown in Table 1.

Table 1: Estimated construction demolition and excavation waste

Waste type	Estimated material quantities that will be generated (tonnes)	Estimated quantity of waste for off-site disposal to landfill (tonnes)
Excavation	94,127	33,809
Demolition	12,059	1,206
Construction	53,410	5,341
Worker accommodation site	0	0
TOTAL	**159,596**	**40,356**

2.3.100 The assessment of the likely significant environmental effects associated with the disposal of CDEW and worker accommodation site waste has been undertaken for the Proposed Scheme as a whole (see Volume 3, Section 14).

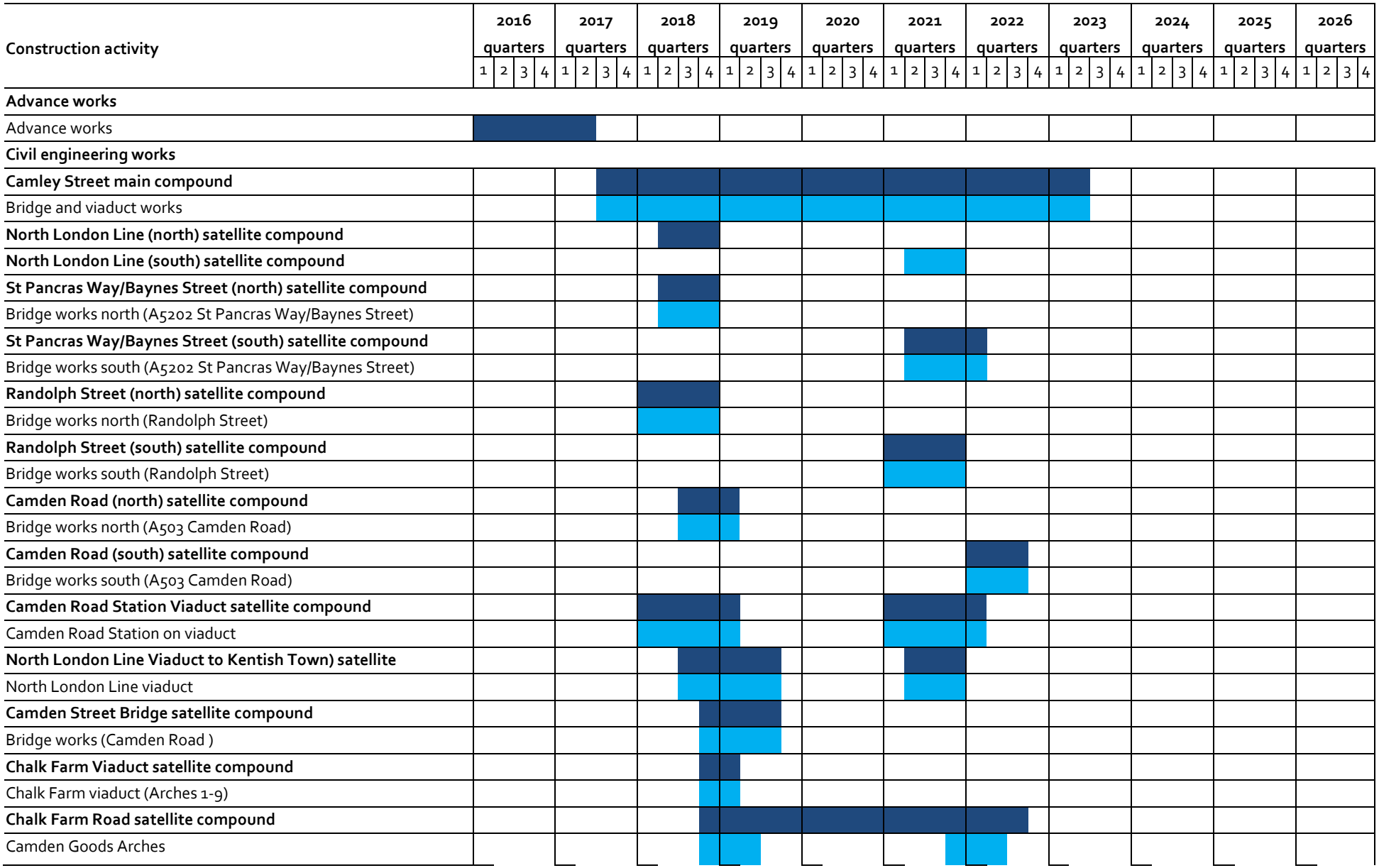
Commissioning of the railway

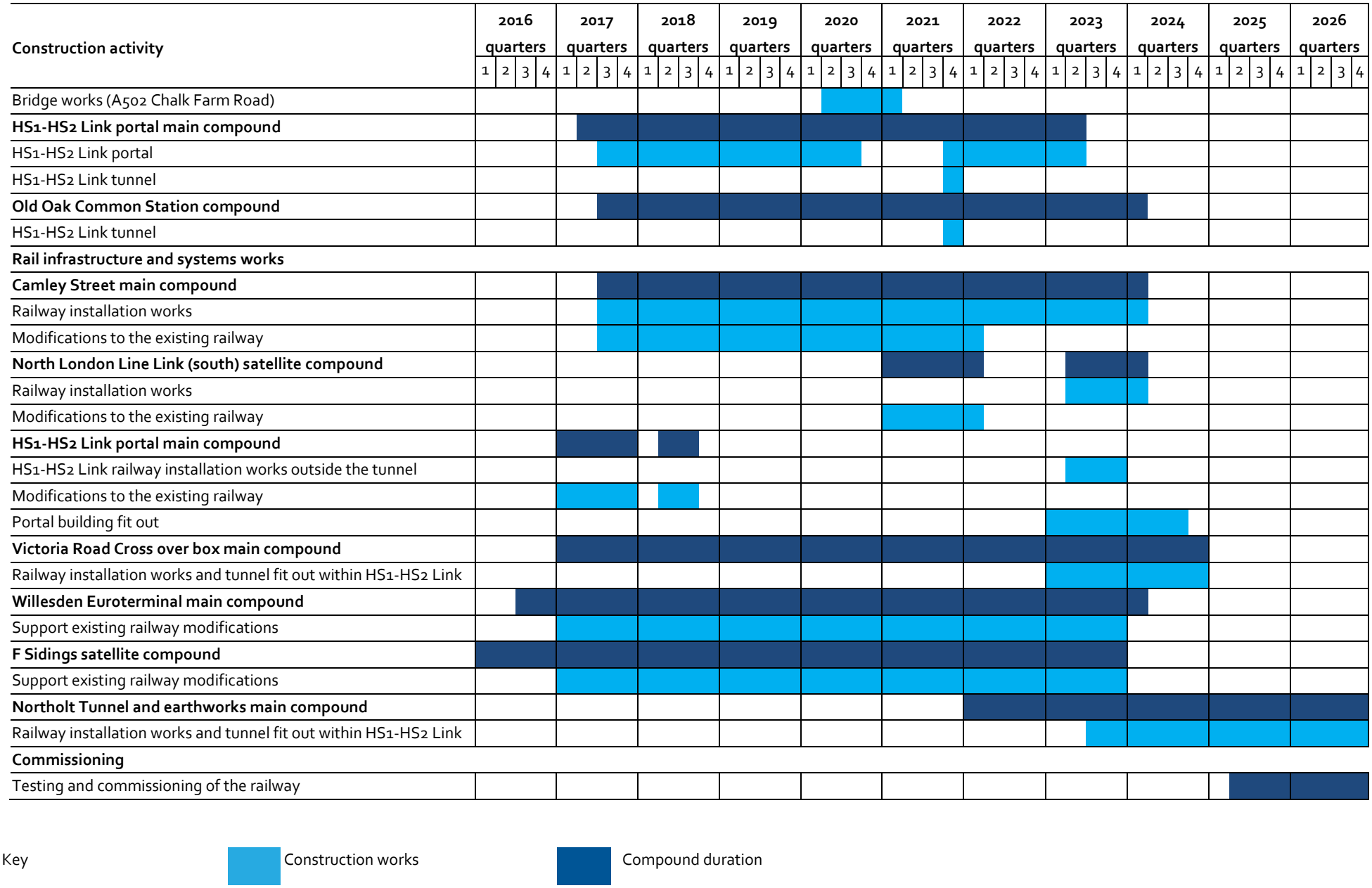
2.3.101 Commissioning is the process of testing the infrastructure to ensure that it operates as expected. This will take place in the year prior to opening. Further details are provided in Volume 1: Section 6.

Construction programme

2.3.102 A construction programme that illustrates indicative periods for the construction activities in this area described above is provided in Figure 6.

Figure 6: Indicative construction programme




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
Bridge works (A502 Chalk Farm Road)
HS1-HS2 Link portal main compound
HS1-HS2 Link portal
HS1-HS2 Link tunnel
Old Oak Common Station compound
HS1-HS2 Link tunnel
Rail infrastructure and systems works
Camley Street main compound
Railway installation works
Modifications to the existing railway
North London Line Link (south) satellite compound
Railway installation works
Modifications to the existing railway
HS1-HS2 Link portal main compound
HS1-HS2 Link railway installation works outside the tunnel
Modifications to the existing railway
Portal building fit out
Victoria Road Cross over box main compound
Railway installation works and tunnel fit out within HS1-HS2 Link
Willesden Euroterminal main compound
Support existing railway modifications
F Sidings satellite compound
Support existing railway modifications
Northolt Tunnel and earthworks main compound
Railway installation works and tunnel fit out within HS1-HS2 Link
Commissioning
Testing and commissioning of the railway
Key
Construction works
Compound duration

2.4 Operation of the Proposed Scheme

Operational specification

2.4.1 Volume 1, Section 4.3 describes the envisaged operational characteristics of Phase One of HS2 as a whole and how they may change when Phase Two is also operational.

HS2 services

2.4.2 There will be three trains per hour each way passing through the Camden and HS1 Link area in the morning and evening peak hours, and fewer during other times. The first trains of the day will leave the terminus stations no earlier than 05:00 Monday to Saturday (and 08:00 on Sundays) and the last will arrive no later than midnight.

2.4.3 In this area, trains will run at speeds up to 65kph. The trains will be either single 200m long trains or two 200m long trains coupled together, depending on demand and time of day.

Maintenance

2.4.4 Volume 1, Section 4.3 describes the maintenance regime for HS2.

2.4.5 The intention is that inspections of the route will take place on a regular basis, at night when the railway is not operating. There will be routine preventative maintenance, including grinding and milling of the rails to keep them in good condition, and more periodic heavy maintenance as necessary.

Operational waste and material resources

2.4.6 Forecasts for the amount of operational waste that will be produced annually during the course of the operation of the Proposed Scheme have been prepared and are presented in Volume 5: Appendix WM-001-000.

2.4.7 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. This has only been reported for areas along the route in which these stations will be located.

2.4.8 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.

2.4.9 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.

2.4.10 The quantity of operational waste that will be re-used, recycled and recovered (i.e. diverted from landfill) has been based on waste management performance data from NR as follows:

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

2.4.11 On this basis, approximately 17 tonnes of operational waste will be re-used, recycled and recovered during each year of operation of the Proposed Scheme in the Camden Town and HS1 Link area. Approximately four tonnes will require disposal to landfill (see Table 2).

Table 2: Operational waste forecast for the Proposed Scheme

Waste source	Estimated quantity of waste generated per annum (tonnes)	Estimated quantity of waste for disposal to landfill per annum (tonnes)
Railway station and train	0	0
Rolling stock maintenance	0	0
Track maintenance	19	3
Ancillary infrastructure	2	1
TOTAL	**21**	**4**

2.4.12 The assessment of the likely significant environmental effects associated with the disposal of operational waste has been undertaken for the Proposed Scheme as a whole (see Volume 3, Section 14).

2.5 Community forum engagement

2.5.1 HS2 Ltd's approach to engagement on the Proposed Scheme is set out in Volume 1, Section 3.

2.5.2 A community forum meeting was held on 22 March 2012 at Castlehaven Community Centre. At a public meeting held on the 12 June 2012, forum members in the LBC decided not to engage further with HS2 Ltd through the Community Forum structure. HS2 Ltd has continued engagement with stakeholders and forum members through bi-lateral meetings to provide up to date information and feedback.

2.5.3 Further community forum meetings were held on for 28 January 2013 and 7 October 2013, at Castlehaven Community Centre.

2.5.4 The main themes to emerge from these meetings were:

- concern that the tunnel does not extend to the connection with HS1 at the eastern end of the CFA;
- concern that work on bridge structures would have effects on the Camden economy and a request for a phasing of works;
- concern relating to effects on roads, notably Chalk Farm Road, Gordon House Road and Prince of Wales Road. This included a request for consideration of all access roads in the local area;
- concerns regarding air pollution during construction and operational noise effects;
- concerns in respect of how Camden would benefit from the Proposed Scheme;
- traffic disruption caused by the fire at Camden Lock Village Market in 2008; and
- concern over the use of Jeffrey's Street as a construction traffic route.

2.5.5 Draft Environmental Statement and Design Refinement consultations were launched on 16 May 2013 for a period of eight weeks and closed on the 11 July 2013. 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 Environmental Statement and the development of the 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 Proposed Scheme. In the Camden Town and HS1 Link area consultation on the draft Environmental Statement and on the Design Refinement was held on the 22 June 2013, at Castlehaven Community Centre. HS2 Ltd staff attended the events, including engineers and environmental specialists, for members of the public to speak to.

2.5.6 Responses from the draft Environmental Statement consultation have been analysed and an overview of those received and how the Environmental Statement has taken account of responses is contained in the draft Environmental Statement Consultation Summary Report (see Volume 5: Appendix CT-008-000).

2.6 Route section main alternatives

2.6.1 The main strategic alternatives to the Proposed Scheme are presented in Volume 1. The main local alternatives considered for the Proposed Scheme within the local area are set out within this section.

2.6.2 Since April 2012, as part of the design development process, a series of local alternatives have been considered at workshops attended by engineering, planning and environmental specialists. During these workshops, the likely significant environmental effects of each design option have been reviewed. The purpose of these reviews has been to ensure that the Proposed Scheme draws the right balance

between meeting engineering requirements and minimising cost and potential environmental impacts.

HS1-HS2 connection options

2.6.3 The Proposed Scheme is described in Section 2.2 and is essentially the January 2012 route announced by the Secretary of State with the addition of design development. This design development comprises:

- the widening of the Kentish Town viaduct and track re-alignment to allow the HS1-HS2 Link and NR NLL to operate independently on separate routes; and
- the relocation of the HS1-HS2 tunnel portal to be clear of the WCML tracks.

2.6.4 HS2 Ltd examined four other options for the connection between HS1 and the Proposed Scheme (HS2) ahead of the publication of the draft ES and compared them to the Proposed Scheme. These were:

- creating space for the tunnel portal by demolishing approximately 240m of the south side of the existing NLL Viaduct. This would leave the north side to carry two new tracks for classic rail trains. A new tunnelled section would be provided which would pass over the top of the LUL Northern Line tunnels. The route would then come back up to the surface to use the existing bridge over the MML. This option was rejected because it would require permanent closure of three roads and demolition of an additional three residential properties (some Grade II listed) that would not be required for the Proposed Scheme;
- realigning the tunnelled section to pass over the High Barnet branch and under the Edgware Road branch of the LUL Northern Line. This option was rejected because it would require the permanent closure of three roads and demolition of an additional three residential properties (some Grade II listed) that would not be required for the Proposed Scheme;
- the portal ramp would be created on the northern side of the existing viaduct and the new tunnelled section realigned accordingly. This option was rejected because it would require the permanent severance of four roads and demolition of an additional three residential properties some (Grade II listed) that would not be required for the Proposed Scheme; and
- an option that was proposed by NR. This involved extending the tunnelled section of the January 2012 route to a portal east of A5202 St Pancras Way from where the route would rise up and pass under the existing NLL to join the existing triangular connection to HS1 immediately west of the bridge over the MML. This option was rejected because it would require the demolition of an additional 23 residential properties (some Grade II listed) that would not be required for the Proposed Scheme.

2.6.5 HS2 Ltd has examined a further eight options for the connection between HS1 and HS2 since the draft ES was published. These were:

- adding a third railway track from the railway junction to the west of Kentish Town Road to the HS1-HS2 Link tunnel portal. This would involve the widening of the northern side of the Kentish Town Viaduct and the northern and southern sides of the Chalk Farm Viaduct through the Camden Lock Village Market and Camden Stables Market. It would also require the widening of the bridge over the access road to Morrisons supermarket and the retaining wall to the south of Morrisons supermarket petrol station. This option was rejected due to the demolition of a number of Camden market commercial units, a restaurant and associated disruption to the operation of Camden Markets;

- as described in the previous point, but with the HS1-HS2 Link tunnel portal relocated from the site between Regent's Park Road Bridge and Juniper Crescent to within the site of Morrisons supermarket and without the third track along the Chalk Farm Viaduct to the former Primrose Hill Station area. This option was rejected due to the to the demolition of multiple Camden market commercial units and a restaurant as well as impacts on the operation of Morrisons supermarket;

- as for the January 2012 announced route with a shared track arrangement with NR (freight) along the Chalk Farm Viaduct with a line to the HS1-HS2 Link tunnel portal. This option was rejected as it was not considered technically feasible to operate the NR freight operations on the same track as the HS2 trains would utilise;

- a tunnel between Agar Grove and Old Oak Common with a tunnel portal at Maiden Lane Estate. This option was rejected due to the requirement to reconfigure the existing concrete HS1 and NLL viaducts located between the MML and the ECML, the demolition of two concrete batching plants and aggregate delivery rail head, demolitions of residential properties within St Paul's Crescent, disruption to the operation of the NLL, the loss of public open space within the Maiden Lane Estate and the need for two additional vent shafts in Camden;

- the January 2012 announced route built at a later date and requiring a worksite on railway land at Primrose Hill and part of Morrisons supermarket. This would require a 400m section of tunnel to be constructed at Old Oak Common as part of the Proposed Scheme in order to allow future works to be progressed without disruption to the operation of the already completed HS2 tunnels out of Euston. This option was rejected because of the predicated traffic disruption and space restrictions with operating a tunnelling worksite where removal of excavated material would be required in this constrained site in central London;

- the January 2012 announced route plus a third track from the Morrisons supermarket access road bridge to the Roundhouse involving widening the span of the Morrisons supermarket access road bridge and the construction of a retaining wall to the south of the Morrisons supermarket petrol station. This option was rejected owing to the disruption it would cause to the Camden

Stables Market and the requirement for land on the north side of the railway which would include the road on the south side of Morrisons supermarket petrol station and land over which planning permission has been granted for the construction of housing association properties;

- a tunnel between Agar Grove and Old Oak Common with a tunnel portal at Maiden Lane Estate but with the associated vent shafts (at two locations) built at a later date. This would require a 400m section of tunnel to be constructed at Old Oak Common as part of the Proposed Scheme in order to allow future works to be progressed without disruption to the operation of the already completed HS2 tunnels out of Euston. This option was rejected for the reasons stated previously in favour of the development of a tunnel portal at Agar Grove; and in addition, the predicated traffic disruption and space restrictions with operating a tunnelling worksite where removal of excavated material would be required in this site in central London; and
- twin tunnels heading east from two underground turnout caverns[32] located beneath Alexandra Place to a portal in Agar Grove with one additional vent shaft in Camden. This option was rejected because of the number of property demolitions at Alexandra Place and the difficulties of running a tunnelling worksite where spoil removal would be required from this site in central London.

2.6.6 The Proposed Scheme was selected because it requires the demolition of fewer residential properties than the alternatives considered. Furthermore, unlike the alternatives, it would require no permanent loss of public open space and no permanent road closures. It would also minimise the volumes of excavated material removed from a central London site by road.

HS1-HS2 Link tunnel portal

2.6.7 The Proposed Scheme includes a tunnel portal, headhouse and approach ramp located between Regent's Park Road Bridge and the Morrisons supermarket access road bridge. Four other options were examined, as follows:

- the January 2012 announced route. This comprised a tunnel portal and associated headhouse located west of Regent's Park Road Bridge. To the east of the underground tunnel the track would have risen up on a ramp connecting to the surface route, west of Juniper Crescent housing estate. This option was rejected due to direct interaction with the route of the WCML tracks;
- an option where the tunnel portal and associated headhouse would be located to the east of Regent's Park Road Bridge with the route centred between existing NLL and WCML tracks. To the east of the tunnel the track would have risen up the ramp connecting to the surface route at the bridge over the access

[32] To allow the tracks of the HS1-HS2 link and the Euston routes to cross over at points with the tunnels.

road to Morrisons supermarket. This option was rejected due to direct interaction with the route of both NLL tracks;

- an option where the tunnel portal and associated headhouse would be located west of Regent's Park Road Bridge. The tunnel portal structures would have been positioned to maintain the northern NLL track and the WCML track alignments. To the east of the tunnel, the track would have risen up the ramp connecting to the surface route at the bridge over the access road to Morrisons supermarket. This option was rejected due to direct interaction with the route of both NLL tracks and the HS2 tunnel from Euston; and
- an option where the tunnel portal and associated headhouse would be located west of Regent's Park Road Bridge. The TBM receipt chamber compared to the other options would have been smaller, with the evacuation stairs and intervention tunnels located to the east of Regent's Park Road Bridge in a separate headhouse structure. The tunnel portal structures would have been positioned to maintain the northern NLL track, the HS2 tunnels to Euston and the WCML track alignments. To the east of the tunnel the track would have risen up the ramp connecting to the surface route at the bridge over the access road to Morrisons supermarket. This option was rejected due to the direct interaction with WCML railway infrastructure and the need for associated relocation.

2.6.8 In engineering and operational terms, the Proposed Scheme was selected because, when compared to the other options, it will not interfere with the operation of the WCML.

2.6.9 The Proposed Scheme will generate a smaller volume of excavated material for off-site transportation via the local road network.

Bridges, viaducts and Camden Road Station

2.6.10 In addition to the Proposed Scheme that is assessed in this report, option evaluation was undertaken for the eight existing bridges which serve the NLL. These bridges cross over roads and would be demolished and replaced to accommodate HS2. The main options considered were structural alternatives to provide sufficient provision for an additional track for the Proposed Scheme and the realigned NLL railway and external walkways (to allow access for maintenance).

2.6.11 Option evaluation was also undertaken for: two sections of NLL Viaduct; one section of the Chalk Farm Viaduct; and modifications and changes to the viaduct at Camden Road Station. Camden Road Station alternatives considered included structural alterations to platform 1 and the reinstatement of platforms 3 and 4 and passenger access. Alternative works to sections of viaduct were also considered regarding the provision of an additional track for high speed trains and realigned classic track serving the NLL involving the widening and strengthening of the structure, and the addition of external walkways (to allow access for maintenance).

2.6.12 None of the options considered provided clear engineering or operational advantages over the Proposed Scheme.

2.6.13 Similarly, none of the options examined were considered to result in any significant reduction in the associated environmental effects, when compared with the Proposed Scheme.

3 Agriculture, forestry and soils

3.1 Introduction

3.1.1 This environmental topic has been scoped out of the assessment for CFA2 as there are no agricultural activities, forestry activities or soils affected by the Proposed Scheme in this urban area.

4 Air quality

4.1 Introduction

4.1.1 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 Proposed Scheme, covering nitrogen dioxide (NO_2), fine particulate matter (PM_{10} and $PM_{2.5}$)[33] and dust.

4.1.2 The main air quality effects are likely to result from the emissions of the above pollutants from road traffic during construction and operation. Dust emissions will be associated with demolition, site preparation works and the use of haul routes within areas of construction.

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

- Appendix AQ-001-002;
- Map AQ-01-002; and
- Maps AQ-02-002-01 and AQ-02-002-02.

4.1.4 Maps showing the location of the key environmental features can be found in Map Series CT-10 (Volume 2, CFA2 Map Book).

4.2 Scope, assumptions and limitations

4.2.1 The assessment scope, key assumptions and limitations for the air quality assessment are set out in Volume 1, the SMR (Appendix CT-001 -000/1) and the SMR Addendum (Appendix CT -001-00/2) and appendices presented in Volume 5: Appendix AQ-001-002. This report follows the standard assessment methodology.

4.2.2 The study area for the air quality assessment has been determined on the basis of where impacts on air quality might occur from construction activities, from changes in the nature and volume of traffic during construction and operation or where the road network will change. Changes in road traffic will extend for some distance from the route.

4.2.3 The assessment of impacts arising from construction dust emissions has been undertaken using the methodology produced by the Institute of Air Quality Management (IAQM)[34]. It is important to note that this methodology provides a means of assessing the scale and significance of effects that is partly dependent on the approximate number of receptors within close proximity to the dust-generating

[33] $PM_{2.5}$ and PM_{10} describe two size fractions of airborne particles that can be inhaled and therefore are of concern for human health. The designations refer to particles of size less than 10 and 2.5 microns in diameter.
[34] IAQM (2012), Guidance on the assessment of the impacts of construction on air quality and the determination of their significance.

activities. In doing so, it assigns a lower scale of effect to cases where the number of receptors is small, e.g. fewer than 10 within 20m of dust-generating activities. Thus, a single receptor very close to a construction site cannot experience a 'significant effect' as defined by this methodology. The assessment presented here reaches a conclusion that incorporates this concept of significance being dependent on the number of people affected. However, in cases where fewer than 10 properties are within 20m of the construction activity, it will still be the case that mitigation in accordance with the CoCP will be applied.

4.2.4 The assessment of construction traffic impacts has used traffic data that is based on an estimate of the average daily flows in the peak month of the construction period (2017-2026). However, the assessment assumes 2017 vehicle emission rates and 2017 background pollutant concentrations. The reason for this is because 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 year 2017 represents the worst case for the assessment. Furthermore, it has been assumed that the changes in construction traffic would occur for the whole year. In many cases, this represents a pessimistic assumption as the duration of the proposed construction works may be much shorter.

4.3 Environmental baseline

Existing baseline

4.3.1 The environmental baseline reported in this section represents the environmental 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. Concentrations of road traffic-related pollutants are highest in central London. At places very close to roads where traffic flows are high, the airborne concentrations of the main pollutants are elevated substantially when compared to the 'urban background', as exemplified by locations near the A502 Camden High Street and A502 Chalk Farm Road.

4.3.2 Estimates for NO2, PM10 and PM2.5 concentrations have been obtained from London-wide modelled pollution maps for 2011[35], published by the Greater London Authority (GLA) in 2010[36]. The 2011 maps have been used to characterise the baseline air quality in London, in addition to monitoring data and the background concentration maps produced nationally by the Department for Environment, Food and Rural Affairs (Defra) that have been used in the assessment on other parts of the Proposed Scheme outside London[37]. The GLA maps reflect concentrations at all locations, including at the roadside, whereas Defra national maps are background concentrations and do not include the effects of individual roads. It is therefore

[35] The 2011 maps are based on projections from a base year of 2008.
[36] Greater London Authority (2010), London Atmospheric Emissions Inventory, http://data.london.gov.uk/laei-2008; Accessed July 2013.
[37] Defra (2010), Based Background Maps for NOx, NO2, PM10 and PM2.5; http://laqm.defra.gov.uk/maps/maps2010.html; Accessed July 2013.

considered that the GLA maps provide a more accurate indication of baseline conditions at a local level, although their projections do not extend as far into the future as the Defra maps.

4.3.3 This part of the LBC experiences high levels of road traffic that make a significant contribution to air pollution. There are four air quality monitoring stations and 24 diffusion tube sites measuring annual average concentrations of NO2 in LBC and of these, six sites were relevant to the study area. Neighbouring boroughs also have extensive monitoring networks.

4.3.4 Data collected by the local authorities show that large parts of the area currently experience long-term and short-term average concentrations[38] of NO2 that are above air quality standards[39], especially in close proximity to major roads.

4.3.5 Air quality standards for PM10 and PM2.5 are currently met in most parts of the study area, although monitoring and mapping data indicate that daily mean PM10 concentrations are above the standard at some roadside locations. Further details regarding the air quality monitoring are shown in Volume 5: Appendix AQ-001-002.

4.3.6 LBC has designated the whole borough as an AQMA, in recognition of the widespread NO2 concentrations in excess of that defined by the air quality standard for the annual average (40µg/m3) (see Map AQ-01-002, Volume 5, Air Quality Map Book).

4.3.7 There are a large number of human receptors in the study area, given its urban nature (see Maps AQ-01-002, AQ-02-002-01 and AQ-02-002-02, Volume 5, Air Quality Map Book). These include many residential properties and commercial businesses located in close proximity to either construction activity and/or roads where traffic flows will change.

4.3.8 There is one ecological receptor with a statutory designation within the study area, the Camley Street Nature Park Local Nature Reserve (LNR) which is also a Site of Metropolitan Importance (SMI). There are also three Local Wildlife Sites (LWS) in the study area as follows:

- the North London Line Site of Biological importance (SBI) is within land required to construct the Proposed Scheme;
- the Copenhagen Junction SBI is immediately adjacent to land required to construct the Proposed Scheme; and
- the London Canals Site of Metropolitan Importance, which encompasses Baynes Street Nature Reserve (a Camden Conservation Area Open Space[40]),

[38] 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.
[39] Air quality standards' cover EU limit values, as defined in EU Directive 2008/50/EC and UK air quality objectives as set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland.
[40] This is discussed in relation to community amenity value in Section 5.

is partly in the land required for the Proposed Scheme and is of county/metropolitan value.

4.3.9 Ecological receptors are sensitive to dust deposition. Other ecological receptors in the study area with similar levels of designation for nature conservation are too far away from construction activity to be affected.

Future baseline

4.3.10 Section 2.1 and Volume 5: Appendix CT-004-000 identify developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the future baseline for the assessment of effects from the construction and operation of the Proposed Scheme.

4.3.11 The potential cumulative impact from committed developments on air quality acting in conjunction with the effects from the construction and operation of the Proposed Scheme have been considered as part of this assessment. This has been achieved by including changes in traffic predicted as a result of the committed developments within the traffic data used for the air quality assessments for construction and operation, in which the future air quality baselines are defined as the 'without the Proposed Scheme' scenarios.

Construction (2017)

4.3.12 Future background pollutant concentrations have been sourced from Defra background maps for 2017 which predict NO2 and PM10 levels in 2017 to be lower than in the 2012 baseline.

Operation (2026)

4.3.13 Future background pollutant concentrations have been sourced from Defra background maps for 2026 which predict NO2 and PM10 levels in 2026 to be lower than in the 2012 baseline.

4.4 Effects arising during construction

Avoidance and mitigation measures

4.4.1 Emissions to the atmosphere will be controlled and managed during construction through the route-wide implementation of the CoCP, where appropriate. The draft CoCP includes a range of mitigation measures that are accepted by the IAQM as being suitable to reduce impacts to as low a level as reasonably practicable. It also makes provision for the preparation of Local Environmental Management Plans (LEMP) which will set out how the project will adapt and deliver the required environmental and community protection measures within each area through the implementation of specific measures including those required to control dust and other emissions from activities in the area.

4.4.2 The assessment has assumed that the general measures detailed in Section 7 of the draft CoCP (Volume 5: Appendix CT-003-000) will be implemented. These include:

- contractors being required to manage dust, air pollution, odour and exhaust emissions during construction works;
- inspection and visual monitoring after engagement with the local authorities to assess the effectiveness of the measures taken to control dust and air pollutant emissions;
- cleaning (including watering) of haul routes and designated vehicle waiting areas to suppress dust;
- keeping soil stockpiles away from sensitive receptors where reasonably practicable, also taking into account the prevailing wind direction relative to sensitive receptors;
- using enclosures to contain dust emitted from construction activities; and
- undertaking soil spreading, seeding and planting of completed earthworks as soon as reasonably practicable following completion of earthworks.

Assessment of impacts and effects

Temporary effects

4.4.3 Impacts from the construction of the Proposed 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 sensitive to dust and exposure to NO2 and PM10, as well as the ecological receptors sensitive to dust.

4.4.4 An assessment of construction traffic emissions has also been undertaken for two sets of scenarios in the construction period: a without the Proposed Scheme scenario and a with the Proposed Scheme scenario. The traffic data include the additional traffic from future committed developments.

4.4.5 In the Camden Town and HS1 Link area, dust-generating activities will occur at sites which are due to be demolished and at construction sites. The main dust-generating activities that have been assessed are as follows:

- the works proposed within the existing railway corridor between A5200 York Way and Juniper Crescent, which will include demolition of buildings/structures, construction of replacement bridge structures and upgrade/installation of new tracks;
- demolition and construction to the east of Regent's Park Road Bridge within the existing railway corridor, where a new portal, headhouse building and tunnel approach ramp will be constructed;
- the operation of construction compounds and satellite compounds/worksites; and

- movement of excavated materials by vehicles leaving the construction sites, with the potential for transfer of dust or mud onto local roads.

4.4.6 With the implementation of mitigation measures contained within the draft CoCP, including the use of LEMP in places where receptors are very close to sources of dust, the assessment of air quality impacts arising from dust emissions has concluded that the impacts will be slight adverse or negligible in magnitude and that the effect will not be significant. The basis for this conclusion can be found in Volume 5: Appendix AQ-001-002, which describes how the assessment has considered the scale of emissions and the proximity of receptors.

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

4.4.8 Examination of the changes in traffic flows for 2017 along the affected roads identified some roads that meet the criteria for assessment. This assessment found that that impacts on local air quality will be slight adverse or negligible and therefore will not be a significant effect for receptors. A full description of this assessment can be found in Volume 5: Appendix AQ-001-002.

Permanent effects

4.4.9 There are no permanent effects anticipated to arise during construction of the Proposed Scheme.

Cumulative effects

4.4.10 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 locally consented schemes, as described in Section 12. In this way, the assessment accounts for cumulative effects.

Other mitigation measures

4.4.11 No other mitigation measures are proposed during construction, in relation to air quality in this area.

Summary of likely significant residual effects

4.4.12 The methods outlined within the draft CoCP to control and manage potential air quality effects from dust emissions at areas of construction activity are considered effective in this section of the Proposed Scheme and no significant residual effects from this source are considered likely. The construction traffic will not give rise to significant adverse residual air quality effects for receptors.

4.5 Effects arising from operation

Avoidance and mitigation measures

4.5.1 No mitigation measures are proposed during operation in relation to air quality in the Camden Town and HS1 Link area.

Assessment of impacts and effects

4.5.2 Impacts from the operation of the Proposed Scheme will relate solely to changes in the volume, composition and distribution of road traffic. There will be no direct atmospheric emissions from the operation of trains that will cause an impact on air quality.

4.5.3 There will be no pollutant emissions from the tunnel portal as there are no air pollutants emitted within the tunnels and indirect emissions from sources such as rail wear and brakes have been assumed to be negligible.

4.5.4 The assessment of operational traffic emissions has been undertaken for two scenarios in the operation year 2026; a without the Proposed Scheme scenario and a with the Proposed Scheme scenario. The traffic data include the additional traffic from future committed developments (see Section 12).

4.5.5 Traffic data in the Camden Town and HS1 Link area have been screened to identify roads that required further assessment and to confirm the likely effect of the change in emissions from vehicles using those roads in 2026.

4.5.6 Some roads are predicted to have sufficiently large changes in traffic flows to meet these criteria for a more detailed assessment. This assessment identified that there will be only slight or negligible impacts, both beneficial and adverse, at a number of receptors assessed for NO2, PM10 and PM2.5. These impacts are not significant. Further details regarding this assessment are provided in Volume 5: Appendix AQ-001-002.

Cumulative effects

4.5.7 The traffic data used for the assessment include the traffic changes expected from the committed developments and therefore their impacts have been included within the assessment.

Other mitigation measures

4.5.8 No other mitigation measures are proposed in relation to air quality in this area during operation.

Summary of likely significant residual effects

4.5.9 No significant residual effects are anticipated for air quality in the area from the operation of the Proposed Scheme, in respect on NO2 or PM10 concentrations.

5 Community

5.1 Introduction

5.1.1 This section reports the impacts and likely significant effects on local communities resulting from the construction and operation of the Proposed Scheme.

5.1.2 Key issues concerning the community for this study area comprise:

- amenity impacts on properties on A5202 St Pancras Way; Wrotham Road; Baynes Street; A503 Camden Road; Royal College Street; A400 Kentish Town Road; A502 Chalk Farm Road; and Juniper Crescent;
- temporary disruption to access for market stall holders and users of Camden Market;
- impacts on the new development at Hawley Wharf;
- demolition of a dental surgery at 51 Kentish Town Road (Ivy House Dental Practice); and
- restricted access to parts of Camden Gardens during construction.

5.1.3 Further details of the community assessments and write-ups of open space surveys and recreational public rights of way (PRoW) surveys undertaken within the study area are contained in Volume 5: Appendix CM-001-002.

5.1.4 Significantly affected community resources area shown on Maps CM-01-004b to CM-01-007a (Volume 5, Community Map Book).

5.1.5 The current assessment draws upon information gathered from local and regional sources including the LBC and Ivy House Dental Practice.

5.2 Scope, assumptions and limitations

5.2.1 The assessment scope, key assumptions and limitations for the community assessment are set out in Volume 1, 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.

5.2.2 Due to the large number 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.

5.3 Environmental baseline

Existing baseline

5.3.1 Baseline data on community resources was collected up to 500m from the centre line of the Proposed Scheme and, additionally, up to 250m from the boundary of land required for construction.

5.3.2 The study area includes the area of land required both temporarily and permanently for the construction and operation of the Proposed 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 routeing of construction traffic and takes account of catchment areas for community facilities, which could be affected where crossed by the Proposed Scheme. This area includes land around: Camley Street; Randolph Street and A503 Camden Road; A400 Kentish Town Road; Leybourne Road and A502 Chalk Farm Road; and the HS1-HS2 Link tunnel portal.

5.3.3 The area is urban and dominated by Victorian terraced housing surrounding the historic core of Camden. There is also a mixture of industrial and modern residential development adjacent to the main rail, canal and road infrastructure.

Camley Street

5.3.4 Camley Street is a north/south road that crosses the Proposed Scheme. It is located between A5200 York Way and Camden Road Station. The area around it has a mix of residential properties and commercial units as well as industrial warehouses and depots associated with the railways that intersect to the east of Camley Street. To the south, Regent's Canal with its associated towpath crosses beneath Camley Street on a south-east to north-west alignment. The LBC has an office on A5200 York Way adjacent to the land required to construct and operate the Proposed Scheme east of Camley Street. The key community facilities in the area include: community centres on St Paul's Crescent, Camley Street and Maiden Lane; the London Irish Community Centre on Camden Square; Christ Apostolic Church on Camley Street; The London Mission Christian Centre and Paget Christian Centre on Camley Street; Camden Trust Day Hospital on Camden Mews; Agar Community Nursery on Wrotham Road; and Frank Barnes School for Deaf Children on Camley Street.

Randolph Street and Camden Road

5.3.5 The key community facilities include: Our Lady's Roman Catholic School on Pratt Street; St Michaels Church of England (C of E) Primary School on Camden Street; the Welfare Centre at Barnes House on A503 Camden Road; St Michaels Church on A503 Camden Road; and All Saints Greek Orthodox Church on A400 Camden Street.

5.3.6 Randolph Street and Camden Road are located to the east of Camden Road Station. The area surrounding these roads is dominated by a mixture of Victorian terraced houses and shops such as those on A5202 St Pancras Way, Baynes Street, Royal College Street and Rousden Street. To the south, Regent's Canal and its associated towpath dissect the area on an east to west alignment.

Kentish Town Road

5.3.7 The area surrounding A400 Kentish Town Road is dominated by a mixture of Victorian terraced houses and modern residential properties. The Ivy House Dental Practice is located at 51 Kentish Town Road. Shops and stalls are located along A400 Kentish Town Road and in Camden Market to the south. Also to the south, close to A400 Kentish Town Road and Camden Market, Regent's Canal and its associated towpath dissect the area on an east to west alignment. Other community facilities in the area include: Holy Trinity Church on Castlehaven Road; Camden Chinese Community Centre; Hawley Infant and Nursery School on Buck Street; The Young Persons Theatre Company in Clarence Hall off A502 Hawley Road; and Camden Gardens bounded by A400 Camden Street, Camden Gardens and A400 Kentish Town Road.

Leybourne Road and Chalk Farm Road

5.3.8 Leybourne Road and the A502 Chalk Farm Road are located to the west of Kentish Town Road and north of Regent's Canal. There is a mixture of residential and commercial units surrounding Leybourne Road and A502 Chalk Farm Road. To the south there is a cluster of shops and recreational facilities where A502 Camden High Street meets A502 Chalk Farm Road. Camden Market, including the Market on Camden High Street along with Camden Lock Market and Stables Market serve important roles locally and also form part of a recognised tourist destination in London. In addition Camden Lock Village Market is located to the east of A502 Chalk Farm Road on the northern bank of Regent's Canal. Other community facilities in the area include: Holy Trinity and St Giles C of E Primary School on Hartland Road and Cavendish School on Inverness Street and Film in Education on Water Lane; The Community Housing Association on A502 Chalk Farm Road; the Castlehaven Community Centre on Castlehaven Road; and Pirate Castle Community Centre on Oval Road.

HS1-HS2 Link tunnel portal

5.3.9 The HS1-HS2 Link tunnel portal is south of A502 Chalk Farm Road. The area surrounding the HS1-HS2 Link tunnel portal is characterised by a mixture of terraced houses such as on Juniper Crescent and Regent's Park Road with Morrisons supermarket and Stables Market to the east and the Roundhouse to the north.

Future baseline

Construction (2017)

5.3.10 Volume 5: Appendix CT-004-000 provides details of the developments that are assumed to have been implemented by 2017. The existing baseline is likely to change due to future development that may introduce new residents and community facilities to the study area. The following developments are likely to be completed prior to the commencement of construction in 2017 and may therefore be impacted by the construction and operation of the Proposed Scheme.

5.3.11 The redevelopment of the eastern part of Maiden Lane Estate (LBC Planning Reference 2012/5552/P) on A5200 York Way will provide 10 new blocks including a 20 storey residential tower and nine mixed use blocks of three to seven storeys incorporating: 265 residential units (141 market/71 social rented/53 intermediate flats); mixed employment/retail/food and drink/community uses at ground floor level and a new energy centre, together with cycle parking, public realm and landscaping.

5.3.12 The development on the corner of A503 Camden Road and Bonny Street (LBC Planning Reference 2011/2072/P) includes: the erection of a building with four, seven and eight storeys, including lower ground level, comprising 54 residential units, 96m^2 of retail/professional and financial services/cafe at lower ground floor level fronting the canal and 111m^2 of retail/cafe use at the ground floor level fronting A503 Camden Road, with associated hard and soft landscaping, car and cycle parking.

5.3.13 The development at Hawley Wharf (LBC Planning Reference 2012/4628/P) will include eight buildings between three and nine storeys in height, which will provide employment, housing, retail market, cinema, produce market and the relocated site for the expansion of Hawley Primary School (a new single form entry primary school and nursery).

Operation (2026)

5.3.14 The review of future baseline conditions has not identified any additional committed developments, within the study area, which will be completed by the year of operation.

5.4 Effects arising during construction

Avoidance and mitigation measures

5.4.1 The following measures have been incorporated into the scheme design as part of the design development process to avoid or minimise the adverse environmental impacts during construction:

- bridge replacement work will not involve work on adjacent bridges at the same time, to reduce the risk of alternative road routes being unavailable during temporary road closures; and
- fabrication of parts of the replacement bridges will take place off-site to reduce the duration of potential disruption.

5.4.2 The draft CoCP includes a range of provisions that will help mitigate community effects associated with construction within this area (see Volume 5: Appendix CT-003-000), including:

- 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 PRoW 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); 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

5.4.3 Details of all assessments of community resources are included in Volume 5: Appendix CM-001-002. Each assessment form presents information that explains the rationale for determining the rating for sensitivity of the affected community resource, magnitude of impact and the assessment of significance.

5.4.4 Access rights over land are also required but will not result in loss of land from any properties in this area.

Camley Street

5.4.5 No significant temporary or permanent effects have been identified within this assessment.

Randolph Street and Camden Road

Temporary effects

Residential properties

5.4.6 The construction works for the replacement of St Pancras Way Bridge are expected to take place over a two year period. Residents in properties on A5202 St Pancras Way, Baynes Street and Wrotham Road (approximately 20 properties) are predicted to experience combined effects due to:

- significant noise associated with construction activities; and
- significant visual effects on views north from flats on Baynes Street and views south from A5202 St Pancras Way and Wrotham Road of construction activities.

5.4.7 The combination of these effects, which will coincide for between one and seven months, will result in a major adverse effect on the amenity of residents which is therefore significant.

5.4.8 The construction works for the replacement of Randolph Street Bridge are expected to take place over a 14 month period. Residents at properties on Randolph Street (approximately 10) are predicted to experience combined effects due to:

- significant noise associated with construction activities; and
- significant visual effects of construction activities on views north from Randolph Street.

5.4.9 The combination of these effects, which will coincide for between three months and one year, will result in a major adverse effect on the amenity of residents and is considered significant.

5.4.10 The construction works for the replacement of Camden Road Bridge are expected to take place over a 14 month period. Residents in properties on A503 Camden Road and Royal College Street (approximately 10 properties) are predicted to experience combined effects due to:

- significant noise effects associated with construction activities; and
- significant visual effects on views south from Camden Road and on views north-west and south from Royal College Street.

5.4.11 The combination of these effects, which will coincide for three months, will result in a moderate adverse effect on the amenity of residents and is considered significant.

Permanent effects

5.4.12 The construction works for the replacement of Camden Road Bridge will result in the demolition of 110 Camden Road. The permanent loss of this single residential property will not be significant in terms of the threshold set for community effects.

Kentish Town Road

Temporary effects

Residential property

5.4.13 The construction works to widen the Kentish Town Viaduct (NLL) will generate in-combination effects for (approximately 10) residential properties at Kentish Town Road. These effects are due to:

- significant noise associated with construction activities for four months duration; and
- significant visual effects associated with views south of works from properties on Kentish Town Road.

5.4.14 The combination of these effects, which will coincide for four months, will result in a major adverse effect on the amenity of residents, which is considered significant.

5.4.15 The future baseline for this assessment includes residential development at Hawley Wharf and some of these properties will be demolished. During these demolition works, the neighbouring residential properties are predicted to experience in-combination effects. These are:

- significant construction noise effects associated with demolition activities for approximately two months duration; and
- significant visual effects associated with views south from properties in the new Hawley Wharf development and nearby properties on Hawley Road.

5.4.16 The combination of these effects, which will coincide for a period of two months, will result in a moderate adverse effect on the amenity of local residents, which is significant.

Community facilities

5.4.17 The construction compound from which works to widen the NLL Viaduct will be undertaken is partly situated on land that is the new location for Hawley Primary School (a planned relocation from its current site on Buck Street). The majority of the construction work to widen the viaduct that will be undertaken from land occupied by the school (i.e. land identified for a playground). The works that are required within the school boundary will, where practicable, be undertaken outside of term time. This would avoid impacts on the functioning of the school and therefore it is considered that the temporary requirement for land will not result in a significant effect on the school. HS2 Ltd will work closely with Hawley Primary School and LBC, to agree a schedule of works.

5.4.18 As outlined above, the works to widen the NLL Viaduct require the demolition of residential properties on the site adjacent to the school. This construction activity is expected to generate in-combination effects. These are significant noise effects associated with demolition activities and significant visual effects associated with views east from the school. The combination of these effects, which will coincide for a period of six weeks, will result in a moderate adverse effect on the amenity of staff and pupils, which is significant. HS2 Ltd will work closely with the school and LBC to identify reasonable practicable measures to mitigate the residual significant amenity effects, including discretionary, measures identified in the draft CoCP.

Open space and recreational public rights of way

5.4.19 The construction works for the replacement of Kentish Town Road Bridge are expected to take place over one year and one month. The construction works for the installation of maintenance walkways on the viaduct through Camden Gardens will be undertaken from Camden Street Bridge satellite compound located on the north side of the viaduct. Construction activity will mean that at certain points during the

construction period, a strip of land (approximately 4m wide) either side of the viaduct in the gardens will not be accessible and users will not be able to use the link under the bridge between the north and south parts of the gardens.

5.4.20 The works will result in a reduction in access to Camden Gardens for approximately one year. During this period, the area underneath the works and underneath the bridge will not be accessible and therefore there will be a reduction of the gardens available for users.

5.4.21 The area required for construction of the Proposed Scheme at this location will be relatively small – up to 10% of the gardens – and the remainder of the gardens will remain open during the whole period of construction activity. Camden Gardens is a valued local resource and there are limited local alternatives. The loss of the land required for the construction of the Proposed Scheme will result in a moderate adverse effect on the local community, and is therefore significant.

5.4.22 In addition to the effects from the land required to construct the Proposed Scheme, the users of Camden Gardens are predicted to experience in-combination effects during the Camden Road Bridge replacement due to:

- significant increases in heavy goods vehicle (HGV) movements on Kentish Town Road associated with construction activities; and
- significant visual effects on views north from Camden Gardens for the duration of the works.

5.4.23 Camden Gardens is a valued local resource and there are limited local alternatives. The combination of these effects will result in a moderate adverse effect on the amenity of users and is considered significant.

5.4.24 Restitution of the gardens following construction will be undertaken in consultation with LBC and may provide opportunities to benefit users.

Permanent effects

Residential properties

5.4.25 The construction works to widen the NLL Viaduct will require the demolition of four properties in A400 Kentish Town Road; two properties at 51 Kentish Town Road and 53/53a Kentish Town Road. The permanent loss of these two properties will not be significant in terms of the threshold applied for community effects.

Community infrastructure

5.4.26 The construction works to widen the NLL Viaduct will also require the demolition of Ivy House Dental Practice (at 51 Kentish Town Road). There are alternative dental practices on the A400 Kentish Town Road (approximately 200m to the north and south) that are accepting new customers. Whilst nearby alternatives are available, it is

considered that the permanent loss of the dental practice is a moderate adverse effect and is therefore considered significant.

5.4.27 As set out above, the future baseline for this assessment assumes the Hawley Wharf development is constructed by 2017. The construction works to widen the NLL Viaduct will require land that will be occupied by a residential block. For the purposes of this assessment, the construction of the Proposed Scheme will result in the demolition of a nine-storey residential block on the site, which is planned to accommodate approximately 40 properties. The demolition of these properties is a major adverse effect, which is significant. HS2 Ltd will work with the developer of the Hawley Wharf site and LBC to avoid the need for this eventuality, although this will require planning consent.

5.4.28 The NLL Viaduct will be widened as it passes alongside the new Hawley Primary School. Once fully constructed in the widened structure will require a narrow strip of land along the southern boundary of the school for the placement of piers to support the viaduct. The outdoor play space (including the multi-use games area) will be reconfigured to make use of additional land that will be available after construction activity has been completed. This will enable outdoor play space at the school to be retained. Therefore it is not considered there will be a significant effect on the function of the school as a result of land required permanently by the Proposed Scheme.

Leybourne Road and Chalk Farm Road

Temporary effects

Residential property

5.4.29 The construction works for the replacement of Chalk Farm Road Bridge are expected to take place within one year. Residents in properties at the junction of Castlehaven Road and the A502 Chalk Farm Road (approximately 20 properties) to the north-west of the construction activity are predicted to experience in-combination effects due to:

- significant noise associated with construction activities over approximately nine months;
- significant visual effects on views south-east from A502 Chalk Farm Road of construction activities; and
- significant effects associated with HGV construction traffic using A502 Chalk Farm Road.

5.4.30 The combination of these effects, which will coincide for a nine month period, will result in a major adverse effect on the amenity of residents, which is considered significant.

Community infrastructure

5.4.31 Camden's markets serve an important role locally and are a recognised tourist destination in London. The main markets are Camden Lock Market, Stables Market and Camden Lock Village Market, comprising over 1,000 shops and stalls. Construction works associated with the demolition and replacement of Chalk Farm Road Bridge are predicted to cause some disruption to market stall holders and users; this is described in Section 10. During a three week period (estimated to be between late December 2019 and early January 2020) a section of A502 Chalk Farm Road could potentially be closed to vehicles, although pedestrian access will be maintained, where possible, for the majority of the period.

5.4.32 Whilst scaffolding is being installed, some market stall operators near Chalk Farm Road Bridge may suffer restricted or loss of access for a few days. Following the installation of the scaffolding, operators will be able to continue their business throughout the construction works, which are expected to take nine months to one year. During a period of several weeks, pedestrians will be rerouted along a protected walkway to maintain their access to the markets, although access for delivery vehicles will be disrupted for periods of a few hours at a time (the programme will be agreed in consultation with market operators). Other access points will remain open.

5.4.33 In the context of approximately 1,000 shops and stalls, only a small proportion of the stalls in the market will be affected and for short periods. The construction works will not affect the ability of the market as a whole to function and the Proposed Scheme will not have significant land requirement, isolation or amenity effects.

5.4.34 It is not considered that there will be any significant temporary or permanent effects on Regent's Canal, including amenity effects.

5.4.35 No significant effects on Castlehaven Community Centre have been identified.

Permanent effects

5.4.36 No significant permanent effects have been identified within this assessment.

HS1-HS2 Link tunnel portal

Temporary effects

5.4.37 The construction works for the HS1-HS2 Link tunnel portal will be undertaken over an eight year period. Residents (of approximately 10 properties) on the western side of Juniper Crescent are predicted to experience in-combination effects due to:

- significant noise associated with construction activities over a seven month period; and
- significant visual effects on views west of construction activities for the duration of the construction works.

5.4.38 The combination of these effects will coincide for approximately seven months and will result in a major adverse effect on the amenity of residents, which is considered significant.

Permanent effects

5.4.39 The construction works for the HS1-HS2 Link tunnel portal will require the demolition of one residential property at 200 Regent's Park Road. The permanent loss of this single residential property will not be significant in terms of the threshold set for community effects.

Cumulative effects

5.4.40 No temporary or permanent cumulative effects have been identified for any of the areas during construction.

Other mitigation measures

5.4.41 The assessment has concluded there are significant adverse effects arising during construction in relation to community resources.

5.4.42 To mitigate the significant effect at Camden Gardens, HS2 Ltd will work with LBC to provide improvements to wayfinding from the area around Camden Gardens to Regent's Canal which will provide an alternative recreation facility for those that use Camden Gardens for dog walking, partially offsetting the temporary effects identified. Removal of the fence at the Baynes Street Local Nature Reserve (following appropriate approval) will also improve access to nearby open space.

Summary of likely significant residual effects

5.4.43 Works to replace bridges as part of the Proposed Scheme will result in effects on the amenity of some residents in properties close to those works. These are A5202 St Pancras Way, Wrotham Road, Baynes Street, Randolph Street, Kentish Town Road, the A503 Camden Road, Royal College Street and the A502 Chalk Farm Road. The construction of the HS1-HS2 Link tunnel portal is predicted to affect the amenity of residents at Juniper Crescent.

5.4.44 The construction works on the Kentish Town Viaduct (NLL) are predicted to affect the new development at Hawley Wharf; the construction of the Proposed Scheme will require the demolition of residential properties and this will result in short term temporary effects on the amenity of the school staff and pupils. The amenity of residents in the remaining parts of the residential development (i.e. part of the wider Hawley Wharf scheme) and Hawley Road will also be temporarily affected over a short period.

5.4.45 A small amount of land will be required during construction of the Proposed Scheme at Camden Gardens. This requirement, plus the construction activity, will generate effects on the users of Camden Gardens. Nearby, the demolition of the dental practice on Kentish Town Road will also result in an effect on the community.

5.5 Effects arising from operation

Avoidance and mitigation measures

5.5.1 The measures incorporated into the scheme design as part of the design development process to avoid or minimise adverse environmental impacts during operation are reported in the topics that inform the assessment of amenity.

Assessment of impacts and effects

5.5.2 No significant effects have been identified during operation.

Cumulative effects

5.5.3 No significant temporary or permanent cumulative effects have been identified for any of the areas during operation.

Other mitigation measures

5.5.4 The above assessment has concluded there are no significant adverse effects arising during operation, therefore no further mitigation is proposed.

Summary of likely significant residual effects

5.5.5 There will be no significant residual effects.

6 Cultural heritage

6.1 Introduction

6.1.1 This section of the report provides a description of the current baseline for heritage assets and an assessment of the likely impacts and significant effects resulting from the construction and operation of the Proposed 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.

6.1.2 With regard to heritage assets, the main issue is the extent to which designated and non-designated assets are affected by the Proposed Scheme. Impacts on assets as a result of the Proposed Scheme will occur largely through the physical removal and alteration of assets and changes to their setting.

6.1.3 Maps showing the location of the key environmental features can be found in Map Series CT-10 (Volume 2, CFA2 Map Book). The location of all designated and non-designated heritage assets are shown on Maps CH-01-004b to CH-01-007a and CH-02-002 to CH-02-003a (Volume 5, Cultural Heritage Map Book). Detailed reports on the cultural heritage character and surveys undertaken within the local area are contained in the Volume 5 Appendices. These include:

- Appendix CH-001-002 – Baseline report;
- Appendix CH-002-002 – Gazetteer of heritage assets; and
- Appendix CH-003-002 – Impact assessment table.

6.1.4 Throughout this section, assets within the study areas are identified with a unique reference code, CAMXXX; further detail on these assets can be found in the gazetteer in Volume 5: Appendix CH-002-002.

6.1.5 Engagement has been undertaken with the Greater London Archaeological Advisory Service and English Heritage historic buildings advisor for London with regard to the nature of the cultural heritage assets within the local area. In addition, engagement has been undertaken with: the LBC conservation officer; conservation area advisory committees; and the Camden Railway Heritage Trust.

6.2 Scope, assumptions and limitations

6.2.1 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). This report follows the standard assessment methodology.

6.2.2 The setting of all designated heritage assets in the zone of theoretical visibility (ZTV)[41] of the Proposed Scheme 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 and permanently, to construct the Proposed Scheme plus 250m. For the purposes of this assessment, any assets within the 10mm settlement contour[42] are included within the assessment.

6.2.3 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.

6.2.4 In undertaking the assessment no areas of survey were identified in the Camden Town and HS1 Link area. 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.

6.3 Environmental baseline

Existing baseline

6.3.1 In compiling this assessment, documentary baseline data was collected from a variety of sources as set out in Volume 5: Appendix CH-001-002.

6.3.2 In addition to collating this baseline data, walkover and site reconnaissance was undertaken from areas of public access or in locations where access was granted. This was undertaken to understand the character and form of heritage assets and the historic landscape; to review the setting of assets; and to identify previously unknown assets.

Designated assets

6.3.3 The following designated heritage assets are located partially or wholly within the land required, temporarily or permanently, for the construction of the Proposed Scheme (see Maps CH-01-004b to CH-01-007a, Volume 5, Cultural Heritage Map Book):

- one Grade II* listed building: Camden Incline Winding Engine House (CAM047);
- one Grade II listed building: Camden Road Station (CAM015), which is located within the Jeffrey's Street Conservation Area (CAM023);

[41] The ZTV used for this purpose in Greater London is shown on Map Series CH-02 (Volume 5, Cultural Heritage Map Book). This covers, in places, a smaller area than the ZTV shown on Map Series LV-07 and LV-08 (Volume 5, Landscape and Visual Assessment Map Book). It has been concluded that there are no designated assets in the areas outside the cultural heritage ZTV the setting of which could be affected by the Proposed Scheme.
[42] The area in which ground settlement arising from tunnelling or other below ground works could be more than 10mm in depth.

- one Grade II listed building: Stanley Sidings stables to the east of a bonded warehouse (CAM045) within the Regent's Canal Conservation Area (CAM11); and
- three conservation areas: Camden Broadway (CAM018); Jeffrey's Street (CAM023); and Regent's Canal (CAM011).

The following designated assets are located within the ZTV (see Maps CH-02-002 to CH-02-003a, Volume 5, Cultural Heritage Map Book):

- one Grade I listed building: the All Saints Greek Orthodox Church (CAM022);
- 11 Grade II* listed buildings:
  - numbers 25 to 48 (consecutive) and attached railings, Lonsdale Square, Celestial Church of Christ (north London parish) and numbers 1 to 24 and attached railings within the Barnsbury Conservation Area (CAM001);
  - Belvin Court within the Chapel Market/Baron Street Conservation Area (CAM003);
  - number 62 Camden Mews (CAM013) the Clock Tower, Caledonian Park, within the Camden Square Conservation Area (CAM014);
  - the Church of St Luke with St Paul within the Bartholomew Estate Conservation Area (CAM025);
  - numbers 6 to 27 and attached railings and lamp holders, Grove Terrace and the Church of St Mary Brookfield within the Dartmouth Park Conservation Area (CAM049); and
  - the Church of St Michael (CAM022); and the Roundhouse, Chalk Farm Road (CAM046).
- 236 Grade II listed buildings: of particular note are the Grade II listed Camden Road Station (CAM015) within the Camden Broadway Conservation Area (CAM018) and the Grade II Stanley sidings stable blocks (CAM045) in the Regent's Canal Conservation Area (CAM011); and
- 22 conservation areas: Barnsbury (CAM001); Chapel Market/Baron Street (CAM002); New River (CAM003); Rosebery Avenue (CAM004); Priory Green (CAM005); Regent's Canal and Regent's Canal West (both within asset grouping CAM011); King's Cross St Pancras and King's Cross (both within asset grouping CAM012); Camden Square (CAM014); Camden Broadway (CAM018); Jeffrey's Street (CAM023); Rochester Estate (CAM024); Bartholomew Estate (CAM025); Kentish Town (CAM027); Camden Town (CAM033); Primrose Hill (CAM035); Kelly Street (CAM043); Inkerman Estate (CAM044); Dartmouth Park (CAM049); Holly Lodge Estate (CAM050); Camden Highgate (CAM051).

Non-designated assets

6.3.4 The following non-designated assets of low value lie wholly or partially within the land required, temporarily or permanently, for the construction of the Proposed Scheme (see Maps CH-01-004b to CH-01-007a, Volume 5, Cultural heritage Map Book):

- Number 110 Camden Road (CAM076);
- numbers 51, 53 and 53a Kentish Town Road (CAM036);
- former Primrose Hill Station and platform (CAM048);
- the Camden Goods Depot (CAM079);
- the site of Maiden Lane Station (CAM065);
- the route of a potential Roman Road (CAM076);
- the North London Line Viaduct (CAM017); and
- the routes of seven historic rail lines: North London Railway (CAM053); London and Bedford Railway (CAM056); Northern Line (CAM057); Hampstead Junction Railway (CAM058); London to Birmingham Railway (CAM059); the Up Empty Carriage[43] (CAM060); and the route of the Camden Tramway (CAM061).

6.3.5 All non-designated heritage assets within 250m of the land required, temporarily or permanently, for the construction of the Proposed Scheme are listed in the gazetteer in Volume 5: Appendix CH-002-003 and identified on Maps CH-01-004b to CH-01-007a (Volume 5, Cultural Heritage Map Book). There are a number of built heritage assets, the setting of which has been considered, for example:

- the Camden Garden Centre (CAM016);
- 65 to 97 Kentish Town Road (CAM038);
- Hawley Road and Castlehaven Road (CAM040); and
- 10-28 Chalk Farm Road (CAM041).

Cultural heritage overview

6.3.6 The underlying geology of the study area comprises London Clay formation. There are no superficial deposits recorded within British Geological Society (BGS) data for the study area. To the north the land rises steeply to the 'Northern Heights' at Highgate and Hampstead. The River Fleet rises in Hampstead and historically flowed through Camden Town. There is a rise between the A5200 York Way and the A5202 St Pancras Way in the east of the study area. In the west there is another slight incline towards Primrose Hill. The remaining topography of the study area is generally flat.

6.3.7 The earliest potential evidence in the broader area relates to the Roman period. The study area is largely within the historic parish of St Pancras. The name is based on the dedication to Pancratius, a Roman Saint and Phrygian martyr popular in the earliest years of Christianity and as early as the 4th century[44]. The site of St Pancras Old Church may have been the site of a Roman temple but is located in the south of the

[43] Up Empty Carriage is the name used in the citation. It refers to the Up Empty Carriage Line, a disused railway line, which is in tunnel through part of the area.
[44] Richardson J. (1997). Kentish Town Past. London, Historical Publications Ltd pp. 6-13.

parish (outside of the study area). The alignment of the A502 Chalk Farm Road (CAM072 is thought to have originated in the Roman period[45] although there is no supporting archaeological evidence.

6.3.8 The evidence for settlement and land management within the study area is limited prior to the 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 study area was also largely developed by the end of the 19th century before systematic archaeological investigation and recording. This development of the area is likely to have resulted in the localised loss of archaeological deposits that may have been present.

6.3.9 Medieval settlement is recorded as being located in Kentish Town to the north and the City of London to the south. Prior to the 19th century, the cartographic evidence (as depicted in the 1746 Rocque map[46]) indicates that the landscape was rural in character, with enclosed field systems bisected by routeways that ran from London to Kentish Town and Hampstead. These routes survive today as the A5202 St Pancras Way, the A400 Kentish Town Road and the A502 Chalk Farm Road.

6.3.10 The suburban developments that characterise the study area originate in the late 18th and early 19th century. The first significant housing development within the study area relates to 1791[47] when Lord Camden granted 1,400 houses to be built as a grand estate on his land. The early demand for building on the Camden estate was never fully realised but the outline grid pattern is seen in modern day Pratt Street, Pender Street and Crowndale Road running from Camden Road east to the A5202 St Pancras Way and Royal College Street and the A503 Camden Street running north to south. Early developments of the Georgian period were aimed at the middle classes and include villas, such as 1 Hawley Road (CAM039) and 51 to 63 Kentish Town Road (CAM036 and CAM037), and superior (high status) terraces characterised by the Camden Broadway Conservation Area (CAM018). Contemporary with this early residential development was the construction of the Paddington to Camden stretch of the Regent's Canal (CAM011), completed in 1816. The canal provided goods transport into London but also encouraged small industrial development, elements of which may survive below ground, recognised by the inclusion of this area as an archaeological priority zone.

6.3.11 Rail companies were established in the early 19th century for the transport of goods to and from London and importantly to connect with the import and export of goods at the London Docks. The first of these main lines to be completed was the London to

[45] The Greater London Historic Environment Record.
[46] John Rocque's Map of London (1746), more formally *A plan of the cities of London and Westminster, and borough of Southwark*.
[47] Weinreb B., Hibbert C., Keay J. and Keay J. (2008), *The London Encyclopaedia*, Macmillan, London.

Birmingham railway (CAM059), which was opened in 1837[48]. The initial plans were to terminate the line at Chalk Farm for interchange from rail to Regent's Canal and onto the docks at Limehouse Basin. The land to the north of Regent's Canal remained largely rural through the parishes of Hampstead and St Pancras allowing for a relatively clear route for a main line to approach London from the north.

6.3.12 A passenger terminal had been built at Euston Station (within the Euston Station and Approach area (CFA1)) by the time of the opening of the line. The company developed much of the west of the study area into the Camden Goods Depot (CAM079) throughout the 19th century. There are some surviving railway structures such as the Roundhouse (an engine shed with integral turn table (CAM046)), the Camden Incline Winding House (CAM047) and Stanley Sidings stables (CAM045).

6.3.13 A similar pattern of development characterises the eastern end of the study area where the Great Northern Railway built King's Cross station in 1851-2, and the Midland Railway built St Pancras station between 1863 and 1868. The Midlands Goods Depot was located east of St Pancras Way. This part of the study area taken up by goods yards, engine sheds, warehouses, repair sheds and sidings (CAM12, CAM63), and rail lands still dominate the landscape. Archaeological remains associated with, for example, the 19th to 20th century warehouses and goods yards were recorded during archaeological investigations[49] undertaken as part of the construction of HS1 terminus and associated works at St Pancras (CAM12).

6.3.14 Following the completion of its main line, the London to Birmingham Railway Company planned the construction of the North London Railway (CAM053). This rail link was built to connect the Birmingham Main Line at Chalk Farm with the docks at Poplar[50] and thus bypass the canal for the transport of freight. The line was designed by Robert Stephenson and constructed from 1846 to 1851. The line ran at rooftop level and is today noted for its bridges such as those crossing Camden Road, in the Camden Broadway Conservation Area (CAM018) and Chalk Farm Road in the Regent's Canal Conservation Area (CAM011). The construction of the NLL Viaduct (CAM017) cut across Camden bisecting terraced housing and both major and minor roads. The current townscape of Camden owes much to this viaduct, with the markets and light industries using the arches and alienated land from the railway. Residential streets survive in a more complete form away from the railway. The Hampstead Junction Railway (CAM058) was constructed in 1860 and formed an extension linking Camden Town to Old Oak Junction. Further expansion included two additional rail lines from the newly built Camden Road Station (CAM015) eastwards in 1870.

6.3.15 Industrial developments arose in Camden because of the proximity of transport links and this influenced the residential development within the study area with

[48] Scholey K.A. (2002), *The Railways of Camden.* Camden History Society. Occasional Paper 4 p22-34.
[49] Greater London Historic Environment Record.
[50] Cherry and Pevsner (2002), *The Buildings of England, London 4: North. London* Yale University Press.

developments of lower quality terraced housing. Camden was notable for its piano making industry from the late 19th century onwards[51] as well as numerous small scale industrial firms. Some small industrial premises were built in mews type developments in the backstreets to the earlier Georgian villas. Examples of this can be seen in the Jeffrey's Street Conservation Area (CAM023).

6.3.16 The increasing passenger links into the study area from the construction of a tramway (CAM061) and in the 20th century from the construction of the London Underground Northern Line (CAM057) led to further urbanisation with the A400 Kentish Town Road and the A502 Camden High Street forming important shopping streets. World War II bomb damage is not mapped for railway infrastructure but significant damage occurred around the railway along the A5202 St Pancras Way and the A502 Hawley Road, which indicates that some bomb damage would have occurred to the railway. The late 20th century saw commercial and residential infilling within the study area with development focusing on the areas cleared following the World War II bomb damage.

Future baseline

Construction (2017)

6.3.17 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2017.

6.3.18 The redevelopment of Hawley Wharf (planning application ref 2012/4628/P) will result in the demolition of built heritage in Leybourne Road and Torbay Street (CAM040). The application includes proposals to refurbish the North London Line Viaduct (CAM017). The assessment of impacts arising from the construction of the Proposed Scheme therefore assumes that the cultural heritage assets CAM040 will be demolished and CAM017 will be altered by time of construction.

Operation (2026)

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

6.4 Effects arising during construction

Avoidance and mitigation measures

6.4.1 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: 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 Proposed Scheme (draft CoCP, Section 8);

[51] Richardson J. (1999), *A History of Camden*. Historical Publications Limited, London.

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

6.4.2 The following measures have been incorporated into the design of the Proposed Scheme to reduce impacts on assets:

- brick structures adjoining bridges will be laterally supported to provide adequate protection where a bridge is scheduled for demolition; and
- the NLL Viaduct (CAM017) will be strengthened in order to retain the original structure where there is a potential for failure due to increased stresses to the spandrel wall[52] and piers (subject to inspection). Remedial works may include repointing, grouting, stitching and/or tie bars.

Assessment of impacts and effects

Temporary effects

6.4.3 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 Proposed Scheme and assets in the wider study area due to the visibility of plant, cranes and equipment; and other construction factors.

6.4.4 No significant effects will occur as a result of temporary impacts on the setting of designated or non-designated heritage assets within the study areas.

Cumulative effects

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

Permanent effects

6.4.6 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 Proposed Scheme, or through changes to the setting of heritage assets through the presence of the Proposed Scheme.

[52] Masonry element that sits on the edge of the arch and that limits the extent of, and retains, the backfill.

Physical impacts

6.4.7 The Grade II listed Camden Road Station (CAM015) is an asset of moderate value. The station canopy will be partially demolished to accommodate the HS1-HS2 Link. This will constitute a medium adverse impact and a moderate adverse effect.

6.4.8 Numbers 51, 53 and 53a Kentish Town Road (CAM036), an asset of low value, will be demolished as part of the viaduct widening. This will constitute a high adverse impact and moderate adverse effect.

6.4.9 An asset of low value at 110 Camden Road (CAM076) will be demolished as part of the viaduct widening. This will constitute a high adverse impact and moderate adverse effect.

6.4.10 Primrose Hill Station and platform (CAM048), an asset of low value, will be demolished as part of the HS1-HS2 Link tunnel portal construction works. This will constitute a high adverse impact and moderate adverse effect.

6.4.11 The Up Empty Carriage (CAM060), an asset of low value, will be demolished during tunnel construction for the Proposed Scheme. This will constitute a high adverse impact and moderate adverse effect.

Impacts on the setting of heritage assets

6.4.12 No significant effects will occur as a result of permanent impacts on the setting of heritage assets.

Permanent cumulative effects

6.4.13 There are no inter-project effects on cultural heritage.

Other mitigation measures

6.4.14 Refinements to the mitigation measures incorporated into the design of the Proposed Scheme or included in the draft CoCP will be considered during detailed design to reduce further the significant effects described previously.

6.4.15 Other mitigation measures to further reduce the significant effects described previously will be considered during the detailed design and will take account of heritage assets. Currently identified opportunities include:

- to reduce the impact to the Grade II listed Camden Road Station (CAM015), architectural features and building materials, which are characteristic of the building, could be retained, where practicable. This could include retaining the drinking fountain in the bridge abutment and the platform canopy. The canopy could be trimmed and refitted to the timber fascia without disturbing the support columns or brackets, or significantly affecting the appearance; and
- the NLL Viaduct (CAM017) and its bridges could retain architectural features and building materials where practicable. Where modifications and refurbishments to the original structure are necessary they could use materials

and design in keeping with the original structure. The mitigation could reduce the impact on the setting of three conservation areas: Camden Broadway (CAM018); Jeffrey's Street (CAM023); and Regent's Canal (CAM011).

Summary of likely residual significant effects

6.4.16 There will be no significant effects on below-ground archaeological remains.

6.4.17 The Proposed Scheme will result in the demolition of a number of built heritage assets including 51, 53 and 53a Kentish Town Road (CAM036), 110 Camden Road (CAM018), Primrose Hill Station and Platform (CAM048) and the Up Empty Carriage (CAM060). Additionally the canopy of the Grade II listed Camden Road Station (CAM015) will be partially demolished. A programme of built heritage works will be prepared to investigate, analyse, report and archive these assets.

6.4.18 No significant effects will occur as a result of permanent impacts on the setting of heritage assets.

6.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

6.5.2 The assessment considers the Proposed Scheme once operational and all effects are considered to be permanent. There will be no physical impacts on buried archaeological remains or other heritage assets arising from the operation of the Proposed Scheme. Impacts on the setting of heritage assets arising from the physical presence of the Proposed 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 Proposed Scheme. Where there is a combined effect on the setting of an asset from the presence of the constructed Scheme and its operation, this is reported in the assessment of operation.

6.5.3 As the Proposed Scheme will mainly operate on existing rail land, there will be no significant additional noise or visual impacts from the operation of the railway, and therefore no consequent significant operational effects on cultural heritage assets.

Cumulative effects

6.5.4 Assessment of inter-project effects on cultural heritage assets arising from the interaction of the Proposed Scheme with cumulative development projects has been undertaken. Committed consents and development allocations are listed in Section 2.1 and shown on Maps CT-13-002 and CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book).

6.5.5 No significant cumulative effects have been identified in relation to cultural heritage.

Other mitigation measures

6.5.6 The Proposed Scheme includes a number of design measures to address potential impacts and significant effects. No additional operational mitigation measures beyond those included within the Proposed Scheme design have been identified. Potential opportunities for further mitigation have not been identified, but will be considered as part of the detailed design process.

Summary of likely residual significant effects

6.5.7 No mitigation beyond that described above has been identified and consequently the residual effects are the same as those reported in the assessment of impacts and effects section.

6.5.8 No significant residual effects have been identified in this assessment.

7 Ecology

7.1 Introduction

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

7.1.2 The principal ecological issues in this area are: the loss of habitat in North London Line Site of Borough Importance Grade 2 (SBI.II) and the loss of trees and buildings with the potential[53] to support bat roosts.

7.1.3 Volume 5 of the ES contains supporting information to the ecological assessment reported in this section, including:

- ecological baseline data (Volume 5: Appendix EC-001-001, EC-001-002, EC-001-003, and EC-001-004); and
- register of effects which are considered to be significant at local/parish level and which are not reported in Volume 2 (Appendix EC-005-001).

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

7.2 Scope, assumptions and limitations

7.2.1 The scope and methodology of the ecological assessment are introduced in the SMR (Volume 5: Appendix CT-001-000/1) and SMR Addendum (Volume 5: Appendix CT-001-000/2). Further detail, including the study area for individual surveys, is provided within the SMR Addendum. The assessment methodology is summarised in Section 8 of Volume 1, along with route-wide assumptions and limitations. Limitations associated with particular surveys are reported in Volume 5: Appendices EC-001-001, EC-001-002, EC-001-003, and EC-001-004.

7.2.2 A Water Framework Directive assessment has been undertaken in conjunction with the environmental assessment. Details of this assessment are presented in Volume 5: Appendix WR-001-000.

7.2.3 The design and the urban location of the Proposed Scheme and the absence or limited extent of suitable habitats means that some species and species groups have been scoped out of the assessment for CFA2. This is because the habitats that support them are not present (e.g. no natural rivers), or are considered inherently unsuitable for certain species of interest due to their man-made nature (e.g. concrete walled

[53] A feature which is identified as being of potentially suitable to support roosting bats. Potential roosts are graded as being of low, moderate or high potential to support bats depending on the likely suitability of the feature concerned.

canals). Within this area these species groups and species include amphibians, badger, dormouse, otter, water vole, and white-clawed crayfish. In addition, as no impacts are expected on aquatic invertebrates and fish they were removed from the survey scope. Further information is presented in Volume 5: Appendices EC-001-001, EC-001-002, EC-001-003, and EC-001-004.

7.2.4 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 PRoW for areas where access was not permitted. Locations with the potential to support key ecological receptors where access could not be gained for survey include the North London Line Site of Borough Importance Grade2 (SBI.II) and railway land throughout this area. Access could not be gained for survey of a number of buildings and trees. Further details are provided in Volume 5: Appendices EC-001-001, EC-001-002, EC-001-003, and EC-001-004.

7.2.5 Where data are limited, a precautionary baseline has been built up according to the guidance provided in the SMR Addendum (Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst case' basis for the subsequent assessment.

7.2.6 The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the Proposed Scheme.

7.3 Environmental baseline

Existing baseline

7.3.1 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 (Appendices EC-001-001, EC-001-002, EC-001-003, and EC-001-004 and Map Series EC-01 to EC-12). Statutory and non-statutory designated sites are shown on Maps EC-01 EC-012 (Volume 5, Ecology Map Book CFA2).

7.3.2 Land required for the construction of the Proposed Scheme and that adjacent to it consists predominantly of a built environment. Public green space[54] mostly occurs in city squares, parks, public gardens, and amenity plantings around buildings. The railway corridor and the Grand Union Canal corridor contain fragmentary wildlife habitat. The Proposed Scheme falls within an area designated in the London Plan as an Area of Urban Ecological Deficiency[55].

Designated sites

7.3.3 There is one statutory designated site located within 500m of the Proposed Scheme. This is the Camley Street Nature Park Local Nature Reserve (LNR) which supports a

[54] Green spaces are areas of natural or semi-natural land. For example parks, gardens and woodlands.
[55] http://www.london.gov.uk/priorities/planning/london-plan.

mosaic of habitats and diverse wildlife for its inner city location including over 300 species of higher plants along with amphibians and birds. Camley Street Nature Park is also a Site of Metropolitan Importance (SMI). The LNR/SMI is located 420m south of the land required for the construction of the Proposed Scheme and is of county/metropolitan value.

7.3.4 There are three Local Wildlife Sites (LWS) relevant to the assessment in this area[56]. They are:

- London Canals Site of Metropolitan Importance (SMI) – supports a number of scarce wetland plants and uncommon plants on banks, brickwork and towpaths. The canal supports bird, invertebrate, and fish species. The SMI encompasses Baynes Street Nature Reserve (a Camden Conservation Area Open Space[57]). The site is partly in the land required for the Proposed Scheme and is of county/metropolitan value;
- Copenhagen Junction Site of Borough Importance Grade 1 (SBI.I) – provides and important corridor of habitat mosaic of open and wooded habitats suitable for birds, mammals and insects. Dominant habitats include a combination of ruderal and rough grassland habitats. The site is adjacent to the railway modification works[58] for the Proposed Scheme and is of district/borough value; and
- North London Line (NLL) at York Way Site of Borough Importance Grade 2 (SBI.II) – supports buddleia scrub and bramble with scattered silver birch and sycamore trees. This site is not accessible to the public and the habitats on railway land provide a corridor resource for wildlife undisturbed by recreational use. The site is partly in the land required for railway modification works to enable construction site access to cable troughs, OLE masts and line side equipment for the Proposed Scheme and is of district/borough value.

Habitats

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

Scrub

7.3.6 Small patches of scrub interspersed with ruderal vegetation occur in abandoned yards, strips of unused land between buildings, fragmentarily on railway line-sides including NLL at York Way SBI.II, and along the canal towpath. Railside habitats are a Camden Biodiversity Action Plan (BAP) habitat[59]. Scrub is of local/parish value.

[56] The SMI is shown within the land that is required to construct the Proposed Scheme because existing live electricity cables in the canal tow path will need to be monitored as part of the works. However, there are no intrusive construction works proposed.
[57] This is discussed in relation to community amenity value in Section 5.
[58] Installation of a second track to serve the HS1-HS2 Link adjacent to the existing HS1 track on an existing viaduct.
[59] Camden Borough Council. 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=8B37C858F7301C3016AF7821B7902471.node2. Accessed: 27/9/2013.

Grassland

7.3.7 Grassland is present along the canal towpath and fragmentarily elsewhere as strips of weedy rough grassland or small areas of urban wildlife enhancement in city squares and parks. Grassland is a Camden BAP habitat. This grassland is of local/parish value.

Water bodies

7.3.8 The Grand Union Canal in this section of the Proposed Scheme is a body of very slow-moving eutrophic fresh water with little if any aquatic vegetation and at the most very sparse water-margin vegetation, mainly in the form of wetland herbs on the banks. Waterways and wetlands is a Camden BAP habitat. The water body in this section of the Proposed Scheme is of local/parish value.

7.3.9 A small balancing pond bordered by buddleia scrub is present at ground level close to an elevated section of the railway where upgrade works associated with the Proposed Scheme will occur. The pond is of local/parish value.

Buildings and structures

7.3.10 Buildings and structures may support very limited higher-plant vegetation, ferns, mosses and lichens. 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 a Camden BAP habitat. The buildings and structures are of local/parish value.

Mosaic and transition habitat

7.3.11 Scrub, grassland, tall-herb ruderal vegetation and ephemeral/perennial vegetation, occur in complexes of mosaic and transition particularly on the North London Line SBI.II. Vegetation includes buddleia and bramble scrub with rough grassland and scattered trees. This habitat is of district/borough value.

Other habitats

7.3.12 Amenity-turf, scattered trees, ornamental shrubbery, and flower beds are present. They are commonly found in city squares, urban parks, and amenity plantings around buildings. Parks and green spaces are Camden BAP habitats. This habitat complex is of local/parish value.

7.3.13 All other habitats are of local/parish value or below are described in more detail in Volume 5: Appendix EC-001-001, EC-002-001, EC-003-001, and EC-004-001.

Protected and/or notable species

7.3.14 A summary of the species relevant to the assessment is provided in Table 3.

Table 3: Protected and/or notable species

Species/ species group	Value	Receptor	Baseline and rationale for valuation
Bats	Up to county/ metropolitan	Bat assemblages present within this area (excluding that associated with Grand Union Canal).	The field survey has not recorded any roosts. However a small number of trees at Camden Gardens have moderate potential for bat roosts and a small number of buildings and trees could not be accessed to assess potential or survey further. Common pipistrelle, soprano pipistrelle and one or more Myotis species were recorded foraging and commuting. Soprano pipistrelle is a species of principal importance[60]. All bats are London BAP species. Due to the lack of access to carry out detailed survey it is not possible to rule out that some trees, buildings and structures 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.
	Local/parish	Bat assemblage foraging and commuting at the Grand Union Canal	The transect surveys recorded regular, low level, dispersed commuting and foraging activity from common and soprano pipistrelle bats with occasional, individual foraging and commuting passes from Myotis species.
Birds	Up to national	Black redstart	Black redstart was not recorded during field surveys. However, further areas of habitat which are potentially suitable for black redstart, including the rail land and light industrial areas were not surveyed due to access restrictions. Black redstart could be present within these areas. The numbers of breeding birds in the UK are low (43 pairs[61]) and these areas are outside the known areas of higher concentrations of this species in London. However a conservative assumption that the species could be present has been made, and if present, they would represent more than 1% of the national population and therefore be of national importance.
	District/borough	Breeding bird assemblage at the Grand Union Canal	A total of 45 species were recorded during the surveys, of which 16 were notable, and 11 were confirmed to be breeding.
Terrestrial invertebrates	Up to district/ borough value	Terrestrial invertebrate assemblage at North London Line SBI.II and other railway land	Field surveys comprising invertebrate scoping from PRoW near North London Line SBI.II recorded a variety of habitats likely to support a range of invertebrates and desk study indicates the presence of invertebrates of note in the area.
Common reptiles	Up to local/parish	Potential common reptile populations at North London Line SBI.II	Field survey comprising scoping from PRoW recorded habitat with the potential to support common reptiles in areas of green space such as North London Line SBI.II. It is considered that if present, reptiles would comprise common species and in low numbers. Slow worm, adder, grass snake and common lizard are a species of principal importance[62] and London BAP priority species.

[60] Natural Environment and Rural Communities (NERC) Act 2006. Section 41: Species of Principal Importance in England.
[61] Mark Holling and the Rare Breeding Birds Panel (July 2012), *British Birds 105*. p409.
[62] Natural Environment and Rural Communities (NERC) Act 2006. Section 41: Species of Principal Importance in England.

Future baseline

Construction (2017)

7.3.15 A summary of the known developments which are assumed to be mostly built and occupied prior to construction of the Proposed Scheme is provided in Volume 5: Appendix CT-004-000. None of these developments will affect the character and value of the baseline ecological resources.

Operation (2026)

7.3.16 There are no known committed developments or changes to management in this area that will affect the operational baseline.

7.4 Effects arising during construction

Avoidance and mitigation measures

7.4.1 There are no measures included in the design of the Proposed Scheme in this area which avoid or reduce impacts on features of ecological value.

7.4.2 The assessment assumes implementation of the measures set out within the draft CoCP, which includes translocation of protected species where appropriate.

Assessment of impacts and effects

Designated sites

7.4.3 The rail upgrade work including railway modification works required to enable construction site access may result in the loss of approximately 0.32 ha of the North London Line SBI.II, representing 36% of the site. Potential habitat loss is limited to ruderals, scrub and a small number of trees along the northern part of the SBI. This will result in an adverse effect on the integrity of the SBI.II. This represents a permanent adverse effect significant at the district/borough level.

7.4.4 Where the Proposed Scheme is in the London Canals SMI at Hawley Lock there are no intrusive construction works proposed. However, access will be required to monitor the condition of electricity cables in this area and no intrusive works are required. No significant effects are expected for the London Canals SMI.

7.4.5 Section 5 includes reference to mitigation at Baynes Street Nature Reserve which forms part of the London Canals SMI. The mitigation measures discussed in Section 5 include removal of the fencing to open up a small area of scattered mature trees and amenity grassland to the public. An informal pathway already exists through the trees. It is considered that this measure would have no significant adverse effects on the London Canals SMI.

7.4.6 No significant effects are reported for Camley Street Nature Park LNR/SMI.

Habitats

7.4.7 The rail upgrade work including railway modification works required to enable construction site access may result in the loss of approximately 0.32ha of mosaic and transition habitat at North London Line SBI.II. This will result in an adverse effect on the conservation status of this habitat. This represents a permanent adverse effect significant at the district/borough level.

7.4.8 It is considered unlikely that any other effects on habitat receptors will occur at more than the local/parish level. Local/parish level effects are listed in Volume 5: Appendix EC-005-001.

Species

7.4.9 The removal or disturbance of habitat features that are used by bats during breeding, hibernation or migrating between roosts are considered to have the potential to result in adverse effects on the bat populations or assemblages during construction. However, the point at which such impacts are considered likely to result in a significant adverse effect on the conservation status of the population concerned will differ dependent on the status of the species concerned.

7.4.10 A small number of buildings, structures and trees with the potential to support bat roosts will be removed, disturbed or demolished for the railway upgrade works in this area.

7.4.11 Losses of other habitat within the land required for the construction of the Proposed Scheme may require some bats to travel further, and expend more energy during day to day foraging and movement throughout their home range for the duration of construction. However, such effects alone are for all species considered unlikely to result in sufficient disturbance of the populations concerned to result in an adverse effect on their conservation status.

7.4.12 Whilst there are alternative roost sites in the area, the loss of buildings and trees has the potential to have a permanent adverse effect on the local bat assemblage populations which will be significant at up to the county/metropolitan level.

7.4.13 The railway upgrade works may remove small areas of habitat which are suitable for black redstart in the rail land and surrounding light industrial areas. However, there is extensive alternative nesting habitat in the area and the habitat loss is therefore not considered to affect the conservation status of this species. In addition, the timing of the works will comply with the principles set out in the SMR Addendum (Volume 5: Appendix CT-001-000) outside the breeding season, should birds be encountered during construction. The loss of habitat will not be significant for black redstart.

7.4.14 It is considered unlikely that any other effects on species receptors such as breeding birds, terrestrial invertebrates and common reptiles will occur at more than the local/parish level. Local/parish level effects are listed Volume 5: Appendix EC-005-001.

Other mitigation measures

7.4.15 This section describes additional measures designed to reduce or compensate for significant ecological effects. These include habitat creation at North London Line SBI.

7.4.16 Compensation for the loss of 36% of North London Line SBI.II and 0.32ha of mosaic and transition habitat will include the restoration of 0.32ha of the northern part of the site to tall grassland with locally prevalent herbs, scrub and scattered native trees. There will also be the inclusion of additional features for terrestrial invertebrates, reptiles, and birds including deadwood log piles, and bat boxes. It is considered that this would enhance the existing habitats and a long term beneficial effect is anticipated.

7.4.17 Compensatory bat roosting habitat will be provided in accordance with the principles of mitigation identified in the Volume 5: Appendix CT-001-001. Bat boxes will be installed on trees at the North London Line SBI.II (appropriate given the trees are below the elevated railway at this location). Following the implementation of the measures proposed, any effects on the conservation status of the populations concerned are likely to reduce to a level that is not significant.

Summary of likely residual significant effects

7.4.18 No residual effects are reported at the construction stage.

7.5 Effects arising from operation

Avoidance and mitigation measures

7.5.1 No measures have been included as part of the design of the Proposed Scheme to avoid or reduce impacts on features of ecological value.

Assessment of impacts and effects

7.5.2 The operation of the Proposed Scheme has the potential to result in a variety of impacts on bat populations including those as a result of collision with passing trains, turbulence and noise. The point at which such impacts are considered to result in a significant adverse effect on the conservation status of the population concerned will differ between species. As a consequence, the following assessment of operational impacts takes into account the differing character and nature of the bat populations and/or assemblages concerned in determining the likely effects of the Proposed Scheme on each of these receptors.

7.5.3 Collision risk for bats has been scoped out of the assessment for this area given trains already operate at a similar speed along the existing railway and it is unlikely that even with increased frequency, species would be at greater risk of collision.

7.5.4 No significant effects during operation have been identified.

Other mitigation measures

7.5.5 No mitigation measures for the operational stage are required.

Summary of likely residual significant effects

7.5.6 There are no residual effects at the operational stage.

8 Land quality

8.1 Introduction

8.1.1 This section of the report presents the baseline conditions that exist along the Proposed Scheme in relation to land quality and reports the likely impacts and any significant effects as a result of the construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, mining or mineral resources point of view, including: geological sites of special scientific interest (SSSI), local geological sites (LGS), areas of current underground or opencast mining, and areas of designated mineral resources. Mitigation measures are presented and any residual effects are summarised.

8.1.2 Potentially contaminated areas of land have been identified that could affect, or be affected by, the construction of the Proposed Scheme (for example contaminated soils may need to be removed or the construction may alter existing contamination pathways). Each of these areas has been studied in order to evaluate the scale of potential impacts caused by existing contamination (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 Proposed Scheme will lead to contamination of its surrounding environments and what needs to be done to prevent such contamination.

8.1.3 The main environmental features of this area include:

- residential areas of land; and
- the Grand Union Canal (also known locally as the Regent's Canal).

8.1.4 The main land quality issues in this area include the presence of former potentially contaminating activities; most notably long-standing railway land (including former sidings/depot) on which the Proposed Scheme will be constructed throughout the study area.

8.1.5 Details of baseline information and the land quality assessment methodology are presented in the following appendices (presented in Volume 5):

- Appendix CT-001-000/1 the SMR and Appendix CT-001-000/2, the SMR Addendum; and
- Appendix LQ-001-002: Land quality appendix.

8.1.6 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 13. Issues regarding the disposal of waste materials including contaminated soils, are addressed in Volume 3, Section 14.

8.1.7 Engagement has been undertaken with the LBI, LBC, the Environment Agency and the Petroleum Officers (London Fire Brigade) in relation to information held on land contamination. Information provided is described in Volume 5: Appendix LQ-001-002. Information sought has been incorporated where received.

8.2 Scope, assumptions and limitations

8.2.1 The assessment scope, key assumptions and limitations for the land quality assessment are set out in Volume 1 and in 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 Baseline data was reviewed for the area within the area of land required to construct the Proposed Scheme, excluding areas of utility works on the highway, together with a buffer generally extending out for a further 250m, and in the case of groundwater data up to 1km. This is defined as the study area.

8.2.3 Familiarisation visits to the study area were made in March 2013, where the location of the Proposed Scheme was viewed from points of public access only. It was not possible to visit sites identified for detailed walkover inspections because of land access constraints. The purpose of the sites visits was to verify desktop information and the lack of complete site walkovers is considered unlikely to have substantially impacted the land quality assessment.

8.3 Environmental baseline

Existing baseline

8.3.1 Unless otherwise stated, all features described in this section are presented in Maps LQ-01-002 and LQ-01-003a (Volume 5, Land Quality Map Book).

Geology

8.3.2 This section describes the underlying ground conditions within 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-02-002 (Volume 5, Water Resources and Flood Risk Assessment Map Book).

8.3.3 Made ground is not shown as being present on the published geological map[63]. However, a cover of made ground is likely to be present throughout the majority of the study area due to previous cycles of development.

8.3.4 Geological mapping indicates that there are no superficial deposits present within the study area.

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

8.3.5 The bedrock geology underlying the whole study area is the London Clay Formation of the Thames Group. Typically this is a stiff blue-grey clay that weathers to brown, with thin beds of sand at the base.

8.3.6 The geological succession beneath the London Clay generally comprises the following:

- the Harwich Formation, a thin sandy deposit (potentially only very localised);
- Lambeth Group (also termed the Woolwich and Reading Formations) which comprises a mixture of clay, sand and occasional pebble beds;
- Thanet Sand Formation, a dense green sand; and
- Cretaceous Chalk Group which is a soft white limestone.

Groundwater

8.3.7 The London Clay which underlies the study area is classified by the Environment Agency as 'unproductive strata', i.e. it is not considered to represent a usable groundwater resource.

8.3.8 The underlying Lambeth Group and Thanet Sand Formations are classified as Secondary A aquifers and the Chalk is classified as a Principal aquifer.

8.3.9 There are three licensed groundwater abstractions within the study area; one of these licenses is for two abstractions on the same property. No unlicensed groundwater abstractions have been identified in the area. There is one Source Protection Zones (SPZ) associated with the abstractions in this study area.

8.3.10 Further detail on the groundwater beneath the Proposed Scheme can be found in Section 13.

Surface waters

8.3.11 Water bodies within the Camden Town and HS1 Link area include the Regent's Canal, lower section, as well as two un-named ponds and a culvert. The route does not cross any surface watercourses in the area.

8.3.12 Further information on surface waters is provided in Section 13.

8.3.13 Surface water features are shown on Map WR-01-002 (Volume 5, Water Resources and Flood Risk Assessment Map book).

Current and historical land use

8.3.14 There are a number of current potentially contaminative land uses within the study area. These were identified by a review of current and historical mapping, inspection of regulatory data and a site reconnaissance of the study area from publicly accessible areas.

8.3.15 The Proposed Scheme is situated predominantly within an existing railway corridor. The main construction compound at Camley Street is located within an existing light industrial estate which comprises a series of motor vehicle repair garages.

8.3.16 Beyond the railway corridor, the study area is occupied by a mixture of predominantly residential and commercial uses, particularly to the north and along the western part of the route. Towards the eastern end of the study area, near the Agar Way Estate, a number of warehouses and depots are present. A concrete works is located immediately north of this location on Freight Lane.

8.3.17 In the area adjoining Regent's Canal, land is in commercial use which includes warehouses, studios, depots and a sorting office as well as motor vehicle repair around Leybourne Road.

8.3.18 Historically, the route principally comprised railway use from the beginning of the 20th century. Historical mapping indicates small pockets of potentially contaminative land uses such as metal sheet works, motor body works, printing works and garages dating back to the early 20th century.

8.3.19 In particular, industrial land use was historically located adjacent to Regent's Canal to the south of Leybourne Road during the early 20th century. Notable industries included engineering works, small buildings annotated as a 'steel works' and timber yards.

8.3.20 Sites identified by the assessment as posing a potential contaminative risk to the Proposed Scheme are (listed from east to west):

- concrete works adjacent to Freight Lane (Map LQ-01-002, D7);
- warehousing and motor vehicle repair garages adjacent to Camley Street (Map LQ-01-002, C6);
- former steel works and cap factory adjacent to the proposed route, located near Camden Road Station (Map LQ-01-002, B6);
- former wharf and engineering works adjacent to the Regent's Canal (Map LQ-01-002, A6);
- a former chemical works, printing works and fuel station located in the south-west of the study area (Map LQ-01-003, G6 and H7); and
- railway land along the route and at the HS1-HS2 Link tunnel portal site (Map LQ-01-003, F5 to J5).

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

Other regulatory data

8.3.22 Regulatory data[64] reviewed include pollution incidents, radioactive and hazardous substances consents and environmental permits (previously landfill, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) licences).

8.3.23 There were no notable regulatory data entries within the land required for the construction of the Proposed Scheme. A relatively large number of entries are located in the study area relating to the various industries that were highlighted in previous sections. These entries are associated with the land in commercial and light industrial use neighbouring the existing railway corridor.

Mining and mineral areas

8.3.24 There are no active mining or mineral sites or Minerals Safeguarding Areas (MSA) within the study area.

8.3.25 No future areas of mining or mineral extraction are known.

Geo-conservation sites

8.3.26 Inspection of supplementary planning guidance issued by London Geodiversity Partnership indicates that there are no current (2013) or potential geological designations (e.g. RIGS/LIGS or geological SSSI) within the study area[65].

Receptors

8.3.27 The sensitive receptors that have been identified within this study area are summarised in Table 4.

Table 4: Summary of receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents	High
		Workers	Moderate
	Controlled Waters	The Regent's Canal	High
	Built Environment	Buildings and property	Low to high
		Underground structures and services	Low

Future baseline

8.3.28 As part of the assessment of potential future baselines, a search was undertaken of all relevant permitted planning applications within the study area. A site at Hawley Wharf

[64] Landmark Information Group (2012), Environmental data supplied as GIS layers. Refer to the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2) for data sources.
[65] Green infrastructure and open environments (March 2012) *London's Foundations: PROTECTING THE GEODIVERSITY OF THE CAPITAL* Supplementary planning guidance, BGS/Natural England.

was identified which comprises land bounded by A502 Chalk Farm Road, Castlehaven Road, A502 Hawley Road, A400 Kentish Town Road and the Regent's Canal.

8.3.29 This site comprises a parcel of land that will be directly intersected by the HS1-HS2 Link. Formerly an area of railway land, the redevelopment into a zone of mixed land use and the associated potential remediation of land contamination could lead to a local improvement in baseline conditions at this site for the future construction (2017) and operation (2026) baselines.

8.4 Effects arising during construction

Avoidance and mitigation measures

8.4.1 The construction assessment takes into account the mitigation measures contained within the draft CoCP (see Volume 5: Appendix CT-003-000). The draft CoCP sets out the measures and standards of work that will be applied to the construction of the Proposed 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 extreme weather events which may affect land quality during construction (draft CoCP, Section 16).

8.4.2 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 be undertaken to determine what, if any, site specific remediation measures will be required to allow the Proposed 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 in accordance with:

- Environment Agency CLR11 'Model Procedures for the Management of Land Contamination' (2004)[66]; and
- British Standard BS10175 'Investigation of Potentially Contaminated Sites' (2011)[67].

8.4.3 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)[68]. The preferred option will then be developed into a remediation strategy, in consultation with regulatory authorities prior to implementation.

8.4.4 Contaminated soils excavated from the site, wherever feasible, will be treated as necessary to remove or render any contamination inactive, and re-used within the Proposed Scheme where needed and suitable for use. 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 re-use) or to an appropriately permitted landfill site.

Assessment of impacts and effects

8.4.5 The Proposed Scheme within the Camden Town and HS1 Link area originates to the east of A5200 York Way. It will be constructed on a succession of existing viaducts. It will enter into a single bore tunnel via a tunnel portal to the east of Regent's Park Road Bridge, which forms the boundary with the adjacent Primrose Hill to Kilburn (Camden) (CFA3) study area.

8.4.6 Throughout the study area, the Proposed Scheme will be constructed within the existing railway corridor. The exceptions to this relevant to the assessment of land contamination are areas of proposed temporary construction, notably:

- a proposed construction compound at Primrose Hill (HS1-HS2 Link tunnel portal main compound) (currently an area of rail land) (Map LQ-01-003a, F5/G5); and
- a proposed construction compound (currently a small industrial estate) adjacent to Camley Street (Map LQ-01-002, C6).

[66] Environment Agency (2004), *CLR11 Model Procedures for the Management of Land Contamination*.
[67] British Standard (2011), *BS10175 Investigation of Potentially Contaminated Sites*.
[68] Sustainable Remediation Forum UK (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation*.

Land contamination

8.4.7 In line with the assessment methodology, as set out in the SMR, SMR addendum and its appendices, an initial screening process was undertaken (identified in the methodology as Stages A and B) to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. In total, 81 areas were considered during this screening process, and of these, 15 of these areas were taken forward to more detailed risk assessments (Stages C and D), in which the potential risks were assessed more fully. All areas assessed are shown on Maps LQ-01-002 and LQ-01-003 (Volume 5, Land Quality Map Book) and those considered as potentially posing a risk to the Proposed Scheme are labelled with a reference number.

8.4.8 Conceptual site models (CSM) have been produced for the 15 sites taken to the Stages C and D assessment. The detailed CSM are provided in Volume 5: Appendix LQ 001-002, Section 3 and the results of the baseline risk assessments are summarised in this Section. Potentially contaminated areas have been grouped and considered together, where appropriate. The following factors have determined the need for a Stage C and D assessments:

- whether the area is on or off the route or associated offline works, e.g. roads;
- the vertical route alignment, i.e. whether the route is in cut or on embankment;
- the presence of underlying Principal or Secondary A aquifers or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors.

8.4.9 A summary of the baseline CSM is provided in Table 5. The impacts and baseline risks quoted are before any mitigation is applied. 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 5: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

Area ref[69,70]	Area name/type)	Main potential impacts	Main baseline risk
2-07, 2-79, 2-80	Existing on-site rail land Maps LQ-01-002 and LQ-01-003a	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and	Moderate/low

[69] Each area is assigned a unique identification number (see Volume 5, Appendix LQ-001-002).
[70] CSM have been prepared as part of the detail land contamination methodology (refer to Volume 5) for baseline, construction and post-construction.

Area ref[69,70]	Area name/type)	Main potential impacts	Main baseline risk
		contaminated waters	
		Potential impact on on-site humans to contamination by inhalation of ground-gas and volatile vapours from contaminated soil/water	Moderate/low
		Impact from lateral migration of contaminants in groundwater and discharge to surface waters as base flow	Low
2-60	Existing on-site vehicle repair garages Map LQ-01-002,C6	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 soil and soil-derived dust and contaminated waters	Low
		Potential impact on property from contaminants in soil and surface water/groundwater	Low
2-63, 2-25, 2-62, 2-06, 2-19, 2-26, 2-22, 2-59, 2-20, 2-45, 2-58	Historical off-site or adjacent contaminative land uses and current concrete works Maps LQ-01-002 and LQ-01-003a)	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
		Impact from lateral migration of contaminants to surface water[71]	Low

Temporary effects

8.4.10 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.

8.4.11 Table 6 presents the summary of the construction effects obtained from a comparison of the baseline and construction impacts. The construction risk takes into account the

[71] Pollutant linkage refers to 2-19, 2-22 (former wharf and motor engineering works respectively).

requirements of the draft CoCP to which construction will adhere. The details of these comparisons are presented in Volume 5: Appendix LQ-001-002.

8.4.12 The baseline and construction CSM have been compared to assess effects at the construction stage, and thus to define the level of effect 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 is assessed to remain as high. This will be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.

Table 6: Summary of temporary construction effects

Area ref/area name/type	Main Baseline Risk	Main Construction Risk	Construction effect and significance
2-07, 2-79, 2-80 Existing on-site rail land Maps LQ-01-002 and LQ-01-003a	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 = mod/low Potential impact on on-site humans to contamination by inhalation of ground-gas and volatile vapours from contaminated soil/water = mod/low Impact from lateral migration of contaminants in groundwater and discharge to surface waters as base flow = low	N/A – receptor not present N/A – receptor not present Low	Negligible (not significant)
2-60 Existing on-site vehicle repair garages Map LQ-01-002,C6	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 = mod/low Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust = low Potential impact on property from contaminants in soil and surface water/groundwater = low	N/A – receptor not present Low Low	Negligible (not significant)

Area ref/area name/type	Main Baseline Risk	Main Construction Risk	Construction effect and significance
2-63, 2-25, 2-62, 2-06, 2-19, 2-26, 2-22, 2-59, 2-20, 2-45, 2-58 Historical off-site or adjacent contaminative land uses and current concrete works Maps LQ-01-002 and LQ-01-003a	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 = mod/low Impact from lateral migration of contaminants in groundwater and discharge to surface waters as base flow[72] = low Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust = low	Mod/low Low Low	Negligible (not significant)

8.4.13 The main construction risk is the risk from the construction of the Proposed Scheme assuming that any mitigation measures as set out in the draft CoCP have been implemented. The temporary effect and significance has been determined by calculation of the change in risk between the main baseline risk and the main construction risk. Therefore, 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 is deemed to be high.

8.4.14 Table 6 indicates that during construction activities there will be an overall negligible effect (i.e. the effects will not be significant).

8.4.15 The main potential risks identified are associated with on-site human health where current and historical potentially contaminating activities are intersected by the Proposed Scheme.

8.4.16 It is expected that the measures adopted within the draft CoCP will ensure that risks will not be increased over baseline conditions, and some instances (particularly risks to human health), can be expected to improve during construction as remediation is progressed.

8.4.17 Construction 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

[72] Pollutant linkage refers to 2-19, 2-22 (former wharf and motor engineering works respectively).

as fuels, oils and solvents, and the measures outlined in the draft CoCP will manage risks from the storage of such materials.

8.4.18 The main and satellite compounds may also be used for temporary storage of potentially contaminated soils. The measures outlined in the draft CoCP will manage risks from the storage of such materials. The location of these construction site compounds can be found in Section 2.3.

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

8.4.20 There are no likely significant cumulative temporary effects from construction.

Permanent effects

8.4.21 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.

8.4.22 Table 7 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 Volume 5: Appendix LQ-001-002.

Table 7: Summary of permanent (post-construction) effects

Area ref/area name/type	Main Baseline Risk	Main Post-Construction Risk	Construction Effect and Significance]
2-07, 2-79, 2-80 Existing on-site rail land Maps LQ-01-002 and LQ-01-003	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 = mod/low Potential impact on on-site humans to contamination by inhalation of ground-gas and volatile vapours from contaminated soil/water = mod/low Impact from lateral migration of contaminants in groundwater and discharge to surface waters as base flow = low	Low Moderate/low Low	Negligible to minor beneficial (not significant)
2-60 Existing on-site vehicle repair garages Map LQ-01-002,C6	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and	Very low	Negligible to moderate beneficial (significant)

Area ref/area name/type	Main Baseline Risk	Main Post-Construction Risk	Construction Effect and Significance]
	contaminated waters = mod/low 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	
2-63, 2-25, 2-62, 2-06, 2-19, 2-26, 2-22, 2-59, 2-20 2-45, 2-58, Historical off-site or adjacent contaminative land uses and current concrete works Maps LQ-01-002 and LQ-01-003a	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 = mod/low Impact from lateral migration of contaminants in groundwater and discharge to surface waters as base flow[73] = low Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust = low	Moderate/low Low Low	Negligible (not significant)

8.4.23 The magnitude of the permanent effects and their significance have 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 is assessed to remain as high. This will be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.

8.4.24 Table 7 shows that the Proposed Scheme results in either a reduction or no change in the level of risk already existing at each site for both on site and off site receptors.

8.4.25 Depending on the type of remediation undertaken, the beneficial effect for some sites is most likely to comprise the removal of sources of contamination and the breaking of pathways between receptors and sources of contamination through the

[73] Pollutant linkage refers to 2-19, 2-22 (former wharf and motor engineering works respectively).

construction of new hard standing (in the construction sites) and/or the laying of new track bed materials (in the operational part of the Proposed Scheme).

8.4.26 There will be a negligible effect on all sites identified as posing a contaminative risk that are located outside of the area required to construct the Proposed Scheme as these will be unchanged throughout the construction phase and into operation.

Mining/mineral sites

8.4.27 There are no mining or mineral sites located within this study area.

Geo-conservation sites

8.4.28 There are no geo-conservation sites located within this study area.

Other mitigation measures

8.4.29 At this stage, no additional mitigation measures are considered necessary to mitigate risks from land contamination at construction phase beyond those set out in the draft CoCP and instigated as part of required remediation strategies.

Summary of likely significant residual effects

8.4.30 With the application of the mitigation measures detailed above there are likely to be no significant adverse residual effects. There are however likely to be significant beneficial residual effects associated with potential remediation of the existing motor vehicle repair garages located at Camley Street.

8.5 Effects arising from operation

8.5.1 Users of the Proposed Scheme (i.e. rail passengers) whilst within trains, will at all routine times be in a controlled environment, and have therefore been scoped out of the assessment.

Avoidance and mitigation measures

8.5.2 Maintenance and operation of the Proposed Scheme will be in accordance with environmental legislation and good practice whereby appropriate spillage and pollution response procedures will be established.

Assessment of impacts and effects

8.5.3 A new electricity substation will be constructed to replace one that will be removed during construction of the HS1-HS2 Link tunnel portal to the east of Regent's Park Road Bridge[74]. However, the proposed substation, in common with other modern substations, will use secondary containment appropriate to the level of risk.

8.5.4 There are no proposed depot areas within the Camden Town and HS1 Link area.

[74] The replacement electricity substation would be constructed to the south of its current location.

8.5.5 The operation of the trains may give rise to minor contamination through leakage of hydraulic or lubricating oils. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

8.5.6 It is unlikely that there will be any cumulative effects on land quality or in-combination effects on receptors because of the environmental controls that will be placed on operational procedures.

Other mitigation measures

8.5.7 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 Proposed Scheme.

Summary of likely significant residual effects

8.5.8 No significant residual effects are anticipated associated with operation of the Proposed Scheme.

9 Landscape and visual assessment

9.1 Introduction

9.1.1 This section reports the assessment of the likely significant landscape and visual effects. It starts by summarising the baseline conditions found within and around the route of the Proposed Scheme and goes on to describe the significant effects that will arise during construction and operation on landscape character areas (LCA) and visual receptors.

9.1.2 In this section, the operational assessment section refers not just to the running of the trains but also the presence of the new permanent infrastructure associated with the Proposed Scheme.

9.1.3 Principal landscape and visual issues in the area include:

- temporary effects to LCA and visual receptors during construction arising from the demolition of buildings, the removal of existing vegetation, the loss of open space, the presence of worksites, construction plant and construction activity, the replacement of bridges and abutments, the construction of tunnel portals, piling, the widening of the existing viaduct, the installation of new tracks, OLE and external walkways and traffic and pedestrian diversions; and
- permanent landscape and visual effects during operation arising from the new bridges, abutments, taller trains and OLE, external walkways, the widening of the Kentish Town Viaduct and the presence of a tunnel portal approach ramp and headhouse.

9.1.4 A separate but related assessment of effects on the setting of heritage assets is included in Section 6. Further details on the landscape and visual assessment, including engagement, baseline information and assessment findings, are presented in Volume 5: Appendix LV-001-002, which comprises the following parts:

- Part 1 Engagement with technical stakeholders;
- Part 2 Environmental baseline report;
- Part 3 Assessment matrices; and
- Part 4 Schedule of non-significant effects.

9.1.5 The extent of the landscape and visual study area, the distribution of visual receptor viewpoints and the location of verifiable photomontages were provided to LBC and the GLA for comment. Summer field surveys, including photographic studies of LCA and visual assessment of viewpoints, were undertaken from May to July 2012 and from May to June 2013. Winter surveys were undertaken from December 2012 to March 2013.

9.2 Scope, assumption and limitations

9.2.1 The assessment scope, key assumptions and limitations for the landscape and visual assessment are set out in Volume 1, the SMR (Volume 5: Appendix CT-0001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology.

9.2.2 The study area has been informed by the construction and operational phase zones of theoretical visibility (ZTV), which are shown on Maps LV-07-002b to LV-07-004a and LV-08-002b to LV-08-004a (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), and is an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover will mean that the actual visibility is substantially less than that shown in the ZTV and professional judgement out on site has been used to refine the study area to focus on likely significant effects. Tall construction plant (e.g. cranes and piling rigs) are excluded from the ZTV for the construction phase and OLE is excluded from the ZTV for the operational phase, but these are described and taken into account in the assessment of effects on LCA and visual receptors.

9.2.3 LCA and visual receptors within approximately 500m of the Proposed Scheme have been assessed. Long distance views of up to 1.75km have been considered from Parliament Hill as these are designated views recognised in the London View Management Framework Supplementary Planning Guidance (Greater London Authority, 2012)[75].

Limitations

9.2.4 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 approximate the likely views from these locations.

9.3 Environmental baseline

Existing baseline

Landscape baseline

9.3.1 This is a densely developed urban environment, with extensive areas of 19th century and 20th century housing, high street shops and businesses, commercial and industrial estates and a network of transport routes that traverse the area. Rail infrastructure dominates, with the WCML, ECML and MML, the Euston to Watford Line (EWL) and NLL within the study area. The Regent's Canal and the railway viaducts and bridges were built in the 19th century and though much altered, retain

[75] Greater London Authority (2012) *London Plan: London View Management Framework, Supplementary Planning Guidance*, London.

many of their original features, contributing to the strong historic character of the area. The study area includes three conservation areas and many listed buildings including Camden Road Station (Grade II) and the Roundhouse at Chalk Farm (Grade II*). Open spaces in the area include Bingfield Park, Camden Gardens, Castlehaven/Hawley Street open space, the Regent's Canal tow path and Parliament Hill. There is trackside vegetation along the North London Line Site of Borough Importance Grade 2 (SBI.II) but owing to the tight urban grain of much of the study area, the overall vegetation cover is low. The land rises gradually towards the north-west but the topography is largely masked by the overlying urban development.

9.3.2 The landscape character areas have been determined with reference to the London Regional Landscape Framework[76].

9.3.3 The Proposed Scheme lies in the Hampstead Ridge London's 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.

9.3.4 Descriptions of all LCA are provided in Volume 5: Appendix LV-001-002, Part 2. For the purposes of this assessment the study area has been sub-divided into nine discrete LCA, three of which are most likely to be affected. A summary of these LCA is provided below. The LCA are shown on Maps LV-02-002b to LV-02-004a (Volume 5, Landscape and Visual Assessment Map Book).

Camden Road Station, the Viaduct and 19th Century Residential LCA

9.3.5 The character area includes parts of two conservation areas: Camden Broadway and Jeffrey's Street. The NLL runs through the heart of the area, fitting tightly into the urban fabric. Its substantial brick viaduct and the 19th century iron columns supporting the Randolph Street and Camden Road Bridges add to the historic urban character and strong sense of place of the LCA. The viaduct is much altered with the addition of OLE and maintenance walkways, repairs to brickwork and the development of industrial and commercial uses under the arches. Where it crosses Camden Gardens and Prowse Place, the quality and design of the brickwork is still evident. The bridge over the A503 Camden Road, with its distinctive white lettering on a blue background, is a local landmark but other bridges in the area are utilitarian in design. High street shops and businesses line the main roads and these areas are busy with traffic and pedestrians. The densely developed residential streets are quieter and enclosed by 19th century three and four-storey terrace houses. Camden Gardens, a protected London Square, provides the only open space in the LCA; the arched brick viaduct is a distinctive feature of the gardens framing views into the surrounding area. Four main roads cross the area: the A503 Camden Road, Royal College Street, the A5202 St Pancras Way and the A400 Kentish Town Road and the area is highly

[76] Natural England (2011), *London Regional Landscape Framework*.

permeable to pedestrians, cyclists and motorists. The landscape condition is fair and the high levels of through traffic mean that overall tranquillity is low. The landscape is of borough value due to the high architectural quality of Camden Road Station and the intact streets of 19th century housing in the conservation areas. Therefore this character area has a high sensitivity to change.

Camden Markets LCA

9.3.6 The LCA lies partly within the Regent's Canal Conservation Area. The NLL runs through the area on a substantial brick viaduct which splits west of the A400 Kentish Town Road: the Kentish Town Viaduct goes north and the Chalk Farm Viaduct continues west to Primrose Hill. The arches under both branches of the viaduct and the land in between are used for light industry, storage and distribution. The viaduct contributes to the historic urban character and strong sense of place of the LCA although it has been altered over the years, with the addition of OLE and maintenance walkways and repairs to the brickwork. In places, poor maintenance of the viaduct and the neglected condition of the premises under or adjacent to it detract from the condition of the landscape. The bridge over the A502 Camden High Street, with its distinctive mural on one side and its white lettering on a blue background on the other, is a local landmark.

9.3.7 The Camden Stables Market, one of the three markets in the LCA, is in a Grade II listed building, originally a Victorian stables and horse hospital. The area is a popular tourist destination and is a focus of high levels of pedestrian activity by day and night; it has a lively atmosphere. The character of the high street is eclectic, with oversized signage and art work on the 19th century shop fronts. East of the NLL is largely residential with a mixture of 19th and 20th century two and three storey terraced houses and flats set in communal landscapes. The Castlehaven/Hawley Street open space is the main public park. The small scale of the urban grain results in good pedestrian connectivity, although A502 Camden High Street and the A502 Chalk Farm Road are busy through roads. The landscape condition is fair and the continuous road and rail traffic and large numbers of visitors in the area mean that overall tranquillity is low. The landscape is of borough value due to its popularity as a destination for visitors, its distinctive character and its location in the conservation area. Therefore this area has a high sensitivity to change.

Roundhouse and Chalk Farm Road LCA

9.3.8 The LCA is dominated by transport infrastructure: the WCML and EWL join a freight line west of Juniper Crescent in a wide cutting which also includes the remaining buildings of the former Primrose Hill Station and an area of vacant railway land. The freight line descends from a viaduct east of Juniper Crescent and is in cutting by the time it reaches the former station. The scale of the urban form changes around the A502 Chalk Farm Road: a single storey supermarket and large surface level car park, a petrol station and a modern housing development on Juniper Crescent give the area a

more suburban character. The Roundhouse, a Grade II* listed former engine shed built in 1847 and now a performance space, is a local landmark but its original setting has been eroded through 20th century redevelopment. The landscape condition is fair and the continuous road and rail traffic in the area means that overall tranquillity is low. Although it includes part of the Regent's Canal Conservation Area, it shares few of its historic characteristics and is consequently of local value. Therefore this area has a medium sensitivity to change.

Visual baseline

9.3.9 Descriptions of the identified representative viewpoints are provided in Volume 5: Appendix LV-001-002 Part 2. A summary description of the distribution and types of receptors most likely to be affected is provided in this section. The viewpoints are shown on Maps LV-07-002b to LV-07-004a and LV-08-002b to LV-08-004a (Volume 5, Landscape and Visual Assessment Map Book). The viewpoints are numbered to identify their locations. In each case, the middle number (xxx.x.xxx) identifies the type of receptor that is present in this area – 1: Protected or designated view, 2: Residential, 3: Recreational and tourist, 4: Transport.

9.3.10 For most of the study area, dense urban development will limit views of the proposed scheme to receptors in buildings directly overlooking the Euston tunnel portal site at A4201 Parkway, the route of the HS1-HS2 Link on viaduct through Camden and the HS1-HS2 Link tunnel portal at Primrose Hill. The ZTV includes views from more distant locations including tall buildings in the wider area and from Parliament Hill; however in most cases views, if any, will be through gaps between existing buildings or filtered through intervening vegetation.

9.3.11 Protected views have been identified within the study area. The views from Parliament Hill looking south-east towards the Palace of Westminster and St Paul's Cathedral are designated views in the London View Management Framework Supplementary Planning Guidance (SPG)[77] and designated views on the Camden Local Development Framework (LDF) proposals map[78]. The view from Rousden Street looking east is a protected view in the Camden Broadway Conservation Area appraisal[79]. The following views are designated as important views in the Jeffrey's Street Conservation Area Statement[80]:

- from Prowse Place through the railway arch towards 3-9 Jeffrey's Street and through the railway arch towards Bonny Street;
- the view of Camden Road Station from the A503 Camden Road;
- the view of the raised railway from Jeffrey's Street over Camden Street Gardens; and

[77] Greater London Authority (2012), London Plan: London View Management Framework, Supplementary Planning Guidance, London.
[78] London Borough of Camden (accessed on 15 07 2013), *LDF Proposals map:* http://gis.camden.gov.uk/geoserver/LDF.html London.
[79] London Borough of Camden (2009), *Camden Broadway Conservation Area Appraisal*, *London*.

- the view of Camden Gardens from the A400 Kentish Town Road.

9.3.12 Residential receptors have a high sensitivity to change and are located along the route of the Proposed Scheme from the Maiden Lane Estate in the east to the Regent's Park Road in the west. Most views are from dwellings on streets close to the location of the Proposed Scheme: views from further away are screened by the dense intervening development in the area.

9.3.13 Recreational and tourist receptors, also with a high sensitivity to change, are located in Bingfield Park, Camden Gardens, Camden Lock and the Camden Lock markets and the Castlehaven/Hawley Street open space.

9.3.14 People walking or cycling through residential streets have a medium sensitivity to change, but drivers and travellers on busy main roads have a low sensitivity to change. Transport receptors are located along the route, throughout the study area.

Future baseline

9.3.15 A summary of the committed developments which are assumed to be built and occupied prior to either the construction or operation of the Proposed Scheme is provided in the following sections, along with the consequential effect on the character of LCA and nature of views. Developments which will introduce new visual receptors which may be significantly affected are also described. These developments are shown on Maps CT-13-002 and CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book).

Construction (2017)

9.3.16 It is assumed that a number of mixed use and residential developments within the study area would be built and occupied by 2017. They include a redevelopment of the eastern part of the Maiden Lane Estate, developments off the A5200 York Way in the King's Cross Opportunity Area, a redevelopment at the corner of Bonny Street and the A503 Camden Road, at Delancey Street, at Hawley Wharf (between the A502 Chalk Farm Road, Castlehaven Road, the A502 Hawley Road, the A400 Kentish Town Road and the Regent's Canal) and at the corner of Buck Street and Stucley Place. These developments would alter the character of parts of existing LCA but since they would replace or adapt buildings of similar types and uses or be additions to areas with buildings of a comparable scale and design (as in the King's Cross Opportunity Area) they would be largely characteristic of their setting. The developments at King's Cross and Hawley Wharf would result in enhancement of their immediate surroundings. Overall there would be no change to the overall sensitivity of LCA.

9.3.17 New visual receptors which will arise from the completion of committed developments have been identified at the eastern part of the Maiden Lane Estate, in the King's Cross Opportunity Area and in the Hawley Wharf development. Of the remaining committed developments described above, most would replace an existing similar development or would be in an area where visual receptors have already been

identified and included in this assessment. A small number of new receptors who would be significantly affected during construction have been identified. These are:

- Viewpoint 004.2.039: View north from Hawley Wharf development (on Water Lane);
- Viewpoint 004.2.040: View south-west from the A400 Kentish Town Road; and
- Viewpoint 002.2.008: View south from Hawley Wharf development (south of the A502 Hawley Road).

Operation (2026)

9.3.18 The mixed use and residential developments within the study area which it is assumed would be built and occupied by 2026 would locally alter the character of parts of existing LCA, but since they are largely characteristic of their setting, would not change the overall sensitivity of LCA.

9.3.19 The development at Hawley Wharf would partly screen the view from Viewpoint 004.3.036: View north-west from Hawley Lock on Regent's Canal.

9.3.20 Visual receptors in committed developments have been identified at the eastern part of the Maiden Lane Estate, in the King's Cross Opportunity Area and in the Hawley Wharf development. Of the remaining committed developments, most would replace an existing similar development or would be in an area where visual receptors have been already identified and included in this assessment. No new receptors would be significantly affected by the Proposed Scheme during operation.

9.4 Temporary effects arising during construction

9.4.1 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. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main civil engineering works will take place, including establishment of compounds and structure works.

9.4.2 The effects associated with the peak construction phase in the Camden Town and HS1 Link area will generally be considered to be long term given the construction programme (see Section 2.3). Overall, civil engineering works associated with construction in this area will be undertaken between the start of 2017 and the middle of 2023. The Camley Street and HS1-HS2 Link portal main compounds will be in place for this whole period. The satellite compounds will be in place for one to two years, with works in two phases at most locations. The exception to this is Chalk Farm Road satellite compound which will be in place for approximately four years. The civil engineering works at most individual sites along the route in this area will occur for a

period of between approximately nine and 15 months, with the exception of the construction of the HS1-HS2 Link tunnel portal which will occur for approximately six years. Effects during other phases of works are likely to be lesser due to less construction equipment being required at the time and a reduced intensity of construction activity.

9.4.3 The construction works that have been taken into account in determining the effects on landscape and visual receptors and includes:

- demolition of 120 to 136 Camley Street to create a main construction site;
- diversion of existing railway signalling and power and communications cabling and installation of railway OLE, signalling and power supply kiosks within the railway corridor;
- relocation of NR power supply kiosks into the Agar Grove Estate;
- installation of new track and OLE along the northern side of the route for the relocated NLL and new track and OLE along the southern side for the new HS1-HS2 Link;
- installation of walkways for maintenance access on the outside of the south and north sides of the viaduct along the length of the route, requiring the demolition of part of the existing parapet walls;
- replacement of the bridges over A5202 St Pancras Way, Baynes Street, Randolph Street, A503 Camden Road/Royal College Street and the A502 Camden High Street/Chalk Farm Road;
- widening of the Kentish Town Road Bridge and the Kentish Town Viaduct;
- demolition of 110 Camden Road, 178b Royal College Street, 49 and 49a Kentish Town Road, a dental surgery and houses at 51, 53 and 53a Kentish Town Road, 2a Torbay Street, commercial premises within the Chalk Farm Road Viaduct arches and the block of flats currently known as Building W in the Hawley Wharf development;
- construction of platforms three and four at Camden Road Station to service the NLL;
- demolition of the former Primrose Hill Station and 200 Regent's Park Road to create the HS1-HS2 Link portal main compound; and
- construction of the 280m long HS1-HS2 Link approach ramp and the single storey tunnel portal headhouse on the site of the former Primrose Hill Station.

Avoidance and mitigation measures

9.4.4 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):

- maximising the retention and protection of existing trees and vegetation (draft CoCP, Section 12);
- use of well-maintained hoardings and fencing (draft CoCP, Section 5); and
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses (draft CoCP, Section 5).

9.4.5 These measures have been taken account of in the assessment of the construction effects.

Assessment of impacts and effects

9.4.6 The most apparent changes to landscape character and views during construction will result from the presence of construction plant and worksites, the demolition of buildings, bridge replacements, viaduct widening, installation of external walkways and OLE, and the construction of the HS1-HS2 Link approach ramp, portal and headhouse. Effects on the physical landscape will result from the removal of vegetation in the North London Line SBI and a small number of small trees in Camden Gardens and Ivor Street and the removal of elements such as the bridges, columns and other parts of the viaduct which contribute to landscape character. The height of the construction plant, the presence of worksites at street and viaduct level and the close proximity of large scale construction activity to many receptors will result in significant landscape and visual effects during construction.

9.4.7 The effect of works associated with underground utilities has been assessed. There are few street trees in the study area and therefore utilities diversions, which will mainly take place in roads or footpaths, are unlikely to have an impact of trees or vegetation. Utility works will be temporary in nature and are a common occurrence in urban areas. Trees which have amenity value will be retained where possible, in line with the draft CoCP (Section 12), and disturbance minimised. Where vegetation is removed, there will be appropriate replanting.

Landscape assessment

9.4.8 The following section describes the likely significant effects on LCA during construction. All LCA within the study area considered to experience a non-significant effect (minor adverse or negligible) are described in Volume 5: Appendix LV-001-002 Part 4.

Camden Road Station, the Viaduct and 19th Century Residential LCA

9.4.9 The Proposed Scheme will be constructed on the existing viaduct through the centre of the LCA and new tracks and OLE will be laid on both sides of the viaduct for the NLL and the HS1-HS2 Link. Construction of the replacement rail bridges over the A5202 St Pancras Way, Baynes Street, Randolph Street and the A503 Camden Road and bridge widening of the A400 Kentish Town Road will introduce temporary construction sites containing cranes and other construction plant which will be large

scale and prominent new elements into the LCA, especially in residential streets. The removal of 10 19th century cast iron columns supporting the bridge over Randolph Street and the large, single column supporting the Camden Road Bridge will alter the landscape character and affect the setting of the Camden Broadway and Jeffery's Street Conservation Areas in the immediate vicinity of the works.

9.4.10 Small working areas to access the viaduct will be set up in Ivor Street, Prowse Place and the north side of Camden Gardens. The mature trees around the perimeter of Camden Gardens will not be affected by the works, but the use of the gardens will be temporarily restricted. Three semi-mature cherry trees will be removed from close to the viaduct on the northern side of Camden Gardens and three semi-mature rowan trees will be removed from the car park in Ivor Street.

9.4.11 Much of the viaduct work will be carried out within the existing railway corridor. However, construction activity, lorry movements, temporary road closures and the delivery of abnormal loads such as the bridge decks will reduce tranquillity over a wider area of the LCA.

9.4.12 Impacts will be most intense in close proximity to the works but they will diminish across the wider LCA due to the density of the surrounding urban development. Overall, the magnitude of change is considered to be medium.

9.4.13 The medium magnitude of change, assessed alongside the high sensitivity of the character area, will result in a moderate adverse effect.

Camden Markets LCA

9.4.14 The Proposed Scheme will be constructed on the existing viaduct through the centre of the LCA from the A400 Kentish Town Road to the approach road to Juniper Crescent and the supermarket and new tracks and OLE will be installed along the route. Construction of the replacement rail bridge over the A502 Camden High Street/Chalk Farm will introduce cranes and other construction plant to this bridge location. 49a, 51, 53 and 53a Kentish Town Road and Building W in the Hawley Wharf development will be demolished to accommodate works to widen the north side of the viaduct and part of the brick parapet along the viaduct passing through the Camden Village, Camden Lock, and Stables Markets will be removed on one or both sides to accommodate the external maintenance walkways.

9.4.15 Much of the construction activity will take place along the existing railway corridor where there is regular rail maintenance activity already and the construction sites in Leybourne Road and Torbay Street will occupy land currently in industrial use. However, the works will be on a much larger scale than those currently carried out in these locations for maintenance purposes.

9.4.16 Construction activity, lorry movements, temporary road closures and the delivery of abnormal loads such as the bridge decks will reduce current levels of tranquillity in the LCA.

9.4.17 Impacts will be most intense in close proximity to the works but they will diminish across the wider LCA due to the density of the surrounding urban development. Overall, the magnitude of change is considered to be medium.

9.4.18 The medium magnitude of change, assessed alongside the high sensitivity of the character area, will result in a moderate adverse effect.

The Roundhouse and Chalk Farm Road LCA

9.4.19 The Proposed Scheme will be constructed on the Chalk Farm Viaduct and in the WCML and EWL railway corridor west of Juniper Crescent and new tracks and OLE will be installed along the route. Part of the brick parapet of the viaduct will be removed to fit the external walkways.

9.4.20 The construction of the 280m long approach ramp to the HS1-HS2 Link tunnel portal and the HS1-HS2 Link tunnel portal and headhouse on the site of the former Primrose Hill Station will require the demolition of the former railway tunnel[80], 200 Regent's Park Road and part of the former station (currently occupied by two commercial premises and a residence).

9.4.21 Construction will take place largely in the existing railway corridor where there is regular rail maintenance activity and construction activity on the tunnel approach ramp and HS1-HS2 Link tunnel portal and headhouse will take place on land which is substantially lower than the surrounding area.

9.4.22 Construction activity, lorry movements, temporary road closures and the delivery of abnormal loads such as the bridge deck will reduce tranquillity in the LCA.

9.4.23 Impacts will be most intense in close proximity to the works but they will diminish across the wider LCA due to the density of the surrounding urban development. Overall, the magnitude of change is considered to be medium.

9.4.24 The medium magnitude of change, assessed alongside the medium sensitivity of the character area, will result in a moderate adverse effect.

Visual assessment

9.4.25 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken during winter, 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, would be in leaf. Where residential receptors experience significant

[80] Also known as the Up Empty Carriage Line and/or Up Empty Carriage Tunnel.

effects at night time arising from additional lighting, these are also presented in this section. Representative viewpoints within the study area considered to experience a non-significant effect (minor adverse or negligible) are described in Volume 5: Appendix LV-001-002 Part 4.

9.4.26 The number identifies the viewpoint locations which are shown on Maps LV-07-002b to LV-07-004a (Volume 5, Landscape and Visual Assessment Map Book). In each case, the middle number (xxx.x.xxx) identifies the type of receptor that is present in this area – 1: Protected view, 2: Residential, 3: Recreational and tourist and 4: Transport.

9.4.27 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.

Viewpoint 004.4.016: View north from St Pancras Way

9.4.28 The view of the works at the St Pancras Way Bridge site and along the viaduct from the A5202 St Pancras Way will be framed by buildings and partly screened by vegetation growing on land neighbouring the street. The works to replace the bridges, strengthen the abutments and install track, maintenance walkways and OLE, will result in the addition of new features that will be highly visible but viewed as one of a series of components in the middle ground of the view. The temporary works areas, enclosed by temporary fencing and containing cranes, will also be clearly visible. Overall, the magnitude of change is considered to be medium.

9.4.29 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a moderate adverse effect.

Viewpoints 004.2.017: View north from St Pancras Way, Baynes Street, Randolph Street and Royal College Street; and 004.2.018: View south from St Pancras Way

9.4.30 The view of the works at the St Pancras Way and Baynes Street Bridge construction sites and along the viaduct from the dwellings south of the viaduct will be clear and uninterrupted. The works to replace the bridges, strengthen the abutments and install track, maintenance walkways and OLE, will result in a substantial change in the existing view in close proximity to receptors. The temporary works areas, enclosed by fencing and containing cranes, will also be clearly visible. Therefore, the magnitude of change is considered to be high.

9.4.31 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.4.019: View north-east from Baynes Street

9.4.32 The view of the works at the Baynes Street Bridge site and along the viaduct from Baynes Street will be framed by buildings and partly screened by vegetation growing

on land neighbouring the street. The works to replace the bridges, strengthen the abutments and install track, maintenance walkways and OLE, will be highly visible but viewed as one of a series of components in the middle ground of the view. The temporary works areas, enclosed by temporary fencing and containing cranes, will also be clearly visible. The magnitude of change is considered to be medium.

9.4.33 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.2.020: View south from Randolph Street

9.4.34 The view of the works at the Randolph Street Bridge site and along the viaduct from houses and flats in Randolph Street and the eastern end of Rousden Street will be clear and uninterrupted. The works to replace the bridge, rebuild the abutments and install track, maintenance walkways and OLE, will result in a substantial change in the existing view in close proximity to receptors. The works areas, enclosed by temporary fencing and containing cranes, will also be clearly visible. There will be views from the flats at the southern end of Agar Grove but these will be filtered through intervening vegetation. Overall, the magnitude of change is considered to be high.

9.4.35 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.2.021: View south from Rousden Street

9.4.36 The view of the works on the viaduct from houses in Rousden Street will be clear and uninterrupted. There will be oblique views of the work and worksites at the Randolph Street Bridge. The works to replace track, install maintenance walkways and OLE will result in a substantial change in the existing view in close proximity to receptors. Therefore, the magnitude of change is considered to be high.

9.4.37 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.1.022: View east from Rousden Street

9.4.38 There will be close and direct views from the street and residences closest to the bridge of the works to replace the bridge, strengthen the abutments and install new track, parapets, maintenance walkways and OLE. The temporary works areas, enclosed by temporary fencing and containing up to three cranes will also be clearly visible. The scale of the works will result in a substantial change in the view in close proximity to receptors. Therefore, the magnitude of change is considered to be high.

9.4.39 The high magnitude of change assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.4.023: View north-east from Randolph Street

9.4.40 The view of the works and temporary worksite at the Randolph Street Bridge and along the viaduct from Randolph Street will be clear but framed by buildings along the street. The works to replace the bridges, rebuild the abutments and install track, maintenance walkways and OLE, will result in the addition of new features that will be highly visible but viewed as one of a series of components in the middle ground of the view. The temporary works areas, enclosed by temporary fencing and containing cranes will also be clearly visible. The magnitude of change is considered to be medium.

9.4.41 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.2.024: View north-west from residences at the junction of Camden Road and Royal College Street

9.4.42 The view of the works at the Camden Road Bridge and station will be close and direct of oblique from dwellings at the junction. The works to replace the bridges, install maintenance walkways and OLE will result in a substantial change in the existing view in close proximity to receptors. The temporary works areas, enclosed by fencing and containing cranes will also be clearly visible. Therefore, the magnitude of change is considered to be high.

9.4.43 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoints 004.4.025: View north from Camden Road; 004.4.026: View south from Camden Road; and 004.4.027: View south-east from Royal College Street

9.4.44 There will be clear views from the street, partly screened by trees, of the demolitions and the works to replace the bridges, rebuild the abutments and make changes to Camden Road Station. The temporary works areas, containing up to two cranes and enclosed by temporary fencing will also be clearly visible. The scale of the works will result in the addition of new features that will be prominent in the view, in close proximity to receptors. Therefore, the magnitude of change is considered to be high.

9.4.45 The high magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.2.028: View south from dwellings on Ivor Street and Royal College Street

9.4.46 The view of the works at Camden Road Station will be direct and oblique from houses in Ivor Street and Royal College Street over back gardens and intervening vegetation. The works to build the new platforms and to install track and OLE will result in a change in the existing view in close proximity to receptors. Therefore, the magnitude of change is considered to be high.

9.4.47 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.1.029: View north-west from dwellings in Bonny Street and Prowse Place

9.4.48 The works to reinstate platforms three and four at Camden Road Station and install track and OLE will be visible from the street and the dwellings in Bonny Street. The temporary works areas will be located on the north side of the arch and much of the work will take place on the viaduct; consequently, construction activity will be partly screened by the viaduct from this viewpoint. The works will be visible but viewed as one of a series of components in the middle ground of the view. Therefore, the magnitude of change is considered to be medium.

9.4.49 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.1.030: View south-east from Prowse Place

9.4.50 The two construction sites north of the viaduct, the cranes in the worksites in Prowse Place and Ivor Street and the works to reinstate platforms at Camden Road Station and to install new track and OLE will be clearly visible from the street and dwellings at the western end of Ivor Street. The scale of the works will result in a substantial change in the view in close proximity to receptors. Therefore, the magnitude of change is considered to be high.

9.4.51 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.4.031: View north-west from Camden Street

9.4.52 There will be views from the street of the works to install an external walkway, track, and OLE on the bridge and viaduct, partly filtered by the trees in Camden Gardens. The works will result in the addition of new features that will be highly visible but viewed as one of a series of components in the middle ground of the view. Therefore, the magnitude of change is considered to be medium.

9.4.53 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.2.032: View north from dwellings at Camden Gardens

9.4.54 The works at the A400 Kentish Town Road and Camden Street Bridges and along the viaduct will be visible from houses in Camden Gardens. Views of the works to install external walkways on the bridges will be close, but oblique, and views of the works to install external walkways, track, and OLE on the viaduct will be close, but filtered by the trees in Camden Gardens. The works will be prominent where visible but viewed as one of a series of components in the middle ground of the view. The worksite on the north side of Camden Gardens will be largely screened from view by the viaduct. Overall, the magnitude of change is considered to be medium.

9.4.55 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.4.033: View north from Kentish Town Road

9.4.56 The works to install external walkways, track and OLE on the Kentish Town Road Bridge worksite will be clearly visible from the street. The view of the same works on the viaduct will be oblique and filtered by the trees in Camden Gardens. The works will result in the addition of new features that will be highly visible but viewed as one of a series of components in the middle ground of the view. Overall the magnitude of change is considered to be medium.

9.4.57 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.1.034: View south-east from Kentish Town Road/Jeffrey's Street Junction

9.4.58 The works to demolish 51 and 53 Kentish Town Road, widen the bridge over the A400 Kentish Town Road and install track and OLE will be clearly visible from the street, and obliquely visible and partly screened or filtered through trees in Camden Gardens from dwellings in the A400 Kentish Town Road and Camden Street. The scale of the works to the viaduct will result in a substantial alteration to key characteristics of the view. Therefore, the magnitude of change is considered to be high.

9.4.59 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.4.035: View west from Water Lane

9.4.60 There will be views of the construction works to install an external walkway, new track and OLE on the Chalk Farm Viaduct. However construction plant and activities will be viewed in the context of the existing railway viaduct and industrial land uses and therefore, the magnitude of change is considered to be medium.

9.4.61 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.3.036: View west from Hawley Wharf on Regent's Canal

9.4.62 There will be views of the construction works to install an external walkway, new track and OLE on the Chalk Farm Viaduct over the market stalls of Camden Lock Village. However construction plant and activities will be viewed in the context of the existing railway viaduct, trains and OLE and therefore, the magnitude of change is considered to be medium.

9.4.63 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 006.6.001: View south from Hawley Primary School

9.4.64 Views of the works to widen the viaduct and install new track, maintenance walkways and OLE and to demolish Building W in the Hawley Wharf development will be close and direct from Hawley Primary School. Views at ground level will be screened by hoardings, but cranes and construction activity will be visible above. Construction plant and activities will be viewed in the context of the existing railway viaduct and industrial land uses and therefore, the magnitude of change is considered to be medium.

9.4.65 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoints 006.3.004: View west from Camden High Street; and 006.3.005: View south-east from Chalk Farm Road

9.4.66 There will be views of the construction works to replace the bridges, install maintenance walkways and OLE. The construction plant and activities will result in a substantial change in the existing view in close proximity to receptors. The temporary works areas, enclosed by temporary fencing and containing cranes will also be clearly visible. Therefore, the magnitude of change is considered to be high.

9.4.67 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoints 005.2.003: View south from Regent's Park Road; and 006.2.007: View west and north from Juniper Crescent

9.4.68 The demolitions, the tunnel portal and tunnel approach ramp works, the relocation of tracks and the construction worksite will be clearly visible from the dwellings at 202 – 208 Regent's Park Road and in Juniper Crescent which look down onto the site. The construction plant and activities will be viewed in the context of the existing railway corridor and industrial land uses but they are of a major scale and taking place close to the viewpoint. Therefore, the magnitude of change is considered to be high.

9.4.69 The high magnitude of change, assessed alongside the high sensitivity of the receptor, will result in marked deterioration in the existing view, and therefore a major adverse effect.

Viewpoint 004.2.039: View north from Hawley Wharf development (south of Water Lane)

9.4.70 This development is assumed to be mostly built and occupied in advance of construction of the Proposed Scheme.

9.4.71 There will be views from the street of the works to install an external walkway, track, and OLE on the Chalk Farm Viaduct. Construction plant and activities will be viewed in the context of the existing railway viaduct and industrial land uses and therefore, the magnitude of change is considered to be medium.

9.4.72 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 004.2.040: View west and south-west from Kentish Town Road

9.4.73 The Hawley Wharf development is assumed to be built and occupied in advance of construction of the Proposed Scheme, opening up views from dwellings in Kentish Town Road, currently screened by the houses in Torbay Street.

9.4.74 Views of the works to widen the Kentish Town Viaduct and replace track, install maintenance walkways and OLE will be oblique and filtered through back garden vegetation from the dwellings on the Kentish Town Road. Construction plant and activities will be viewed in the context of the existing railway viaduct and industrial land uses and therefore, the magnitude of change is considered to be medium.

9.4.75 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Viewpoint 006.2.008: View south and east from Hawley Road and the Hawley Wharf development

9.4.76 The Hawley Wharf development is assumed to be built and occupied in advance of construction of the Proposed Scheme.

9.4.77 There will be views of the works to demolish Building W (in the Hawley Wharf development), widen the viaduct and replace track and install maintenance walkways and OLE from four storey houses on Hawley Road and the future Hawley Wharf development. The view from the houses will be oblique and filtered through vegetation in back gardens and in the area between the houses and the viaduct. The view from the Hawley Wharf development will be oblique but unimpeded by intervening vegetation. Views at ground level will be screened by hoardings, but cranes and construction activity will be visible above. Construction plant and activities will be viewed in the context of the existing railway viaduct and industrial land uses and therefore, the magnitude of change is considered to be medium.

9.4.78 The existing view already contains the railway viaduct and hence the works will not introduce new features into the view. The railway viaduct and industrial uses have a neglected appearance which detracts from the character of the existing view. Overall, the magnitude of change is considered to be medium. The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect.

Cumulative effects

9.4.79 Volume 5: Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the baseline for the construction of the Proposed Scheme. The consequential cumulative effect of these developments on LCA and viewpoints is described below. Cumulative developments which have been considered in the assessment are shown in Maps CT-13-002 and CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book).

9.4.80 A number of large-scale developments in the King's Cross Opportunity Area would be under construction between 2017 and 2026. These include a mixed use development with residential, commercial uses and open space at York Way/Randell's Road and a mixed use development with residential and commercial uses and open space on part of the former railway lands south of the HS1 Link and west of the A5200 York Way. Receptors of the Proposed Scheme would be mainly screened from construction activity in the King's Cross Opportunity Area by the dense intervening development and the railway corridor out of St Pancras Station. Part of the Hawley Wharf development would be completed after work on the Kentish Town Viaduct has finished and the construction site off Torbay Street has been vacated. There are no known committed developments which are assumed to be under construction at the

same time as the Proposed Scheme which will result in a consequential cumulative effect on LCAs or visual receptors.

Other mitigation measures

9.4.81 No other mitigation measures are considered practicable during construction.

Summary of likely residual significant effects

9.4.82 As no other mitigation measures are considered practicable, the temporary residual significant effects during construction remain as described previously. However, these will be temporary and reversible in nature lasting only for the duration of the construction works. Any residual effects will generally arise from the widespread visibility of construction activity and construction plant from residential receptors, PRoW, and main roads throughout the study area.

9.5 Permanent effects arising during operation

9.5.1 The specific elements of the Proposed Scheme that have been taken into account in determining the effects on landscape and visual receptors and includes:

- the new bridges, bridge parapets, maintenance walkways on the outside of the bridge parapets and viaducts, new bridge abutments, viaduct widening, trains and OLE;
- the relocated NR electrical substation in the Agar Grove Estate;
- the HS1-HS2 Link tunnel portal headhouse building 4.5m high (in relation to current railway track), 60m long and 20m wide, the 280m long tunnel approach ramp and the associated electricity substation and other structures within the portal site at the former Primrose Hill Station;
- the lighting, fencing and permanent hard standing required for the operation and maintenance of the portal site; and
- the change to urban character through loss of heritage and landmark features at Randolph Street and Camden Road Station and the widening of and other changes to the viaduct throughout the study area.

Avoidance and mitigation measures

9.5.2 The operational assessment of impacts and effects is based on year 1 (2026), year 15 (2041) and year 60 (2086) of the Proposed Scheme. A process of iterative design and assessment has been employed to avoid or reduce adverse effects during the operation of the Proposed Scheme. Measures that have been incorporated into the design of the Proposed Scheme include:

- the HS1-HS2 Link tunnel portal headhouse building has been reduced in height from 10m high to 4.5m high; and

- the design for the bridges over the A503 Camden Road and the A502 Camden High Street will allow the restoration of the current decorative lettering scheme and the landmark quality of the bridges.

9.5.3 These measures have been taken account of in the assessment of the operational effects.

Assessment of impacts and effects

9.5.4 The likely significant effects on landscape character and views in operation will arise from the new bridges at the A5202 St Pancras Way, Baynes Street, Randolph Street, the A503 Camden Road/Royal College Street and the A502 Camden High Street/Chalk Farm Road and the HS1-HS2 Link tunnel portal headhouse building. In addition, significant effects will also arise due to the loss of historic structures and brickwork due to the viaduct widening and bridge replacements, the introduction of NLL trains on to the northern side of the viaduct and the taller HS2 trains on the southern side and the new OLE and external walkways.

Landscape assessment

9.5.5 No potential significant effects on LCA have been identified during year 1, year 15 and year 60 of operation. Non-significant effects on LCA are presented in Volume 5: Appendix LV-001-004 Part 4.

9.5.6 The assessment of effects in year 15 assume proposed planting has grown by approximately 450mm a year (i.e. trees will be 7-7.5m high). The assessment of effects in year 60 assumes all planting has reached its fully mature height. However, these estimates may be altered by the impacts of extreme weather events and climate change.

Visual assessment

9.5.7 This section describes the significant effects on visual receptors during year 1, year 15 and year 60 of operation. Non-significant effects on visual receptors are presented in Volume 5: Appendix LV-001-002, Part 4.

9.5.8 For each viewpoint the following assessments have been undertaken:

- effects during winter of year 1 of operation;
- effects during summer of year 1 of operation;
- effects during summer of year 15 of operation; and
- effects during summer of year 60 of operation.

9.5.9 No significant effects at night-time arising from additional lighting have been identified.

9.5.10 The number identifies the viewpoint locations which are shown in Maps LV-08-02b to LV-08-04a (Volume 5, Landscape and Visual Assessment Map Book). In each case, the

middle number (xxx.x.xxx) identifies the type of receptor that is present in this area – 1: Protected view, 2: Residential, 3: Recreational and tourist, 4: Transport.

9.5.11 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.

9.5.12 The view of the Proposed Scheme from viewpoint 004-2-018 (View south from St Pancras Way), illustrated in the photomontage shown in Figure LV-01-006 (Volume 2, CFA2 Map Book), will not be significantly affected. The new bridge and restored abutments will potentially enhance the view from the street and though there will be higher OLE and trains and trains will run along new tracks on the northern side of the tracks, in the context of the railway corridor, none of these will appear as new features in the view. This is reported in more detail in Volume 5: Appendix LV-001-003 Part 4.

9.5.13 The view of the Proposed Scheme from viewpoint 004-2-024 (View north-west from residences at the junction of Camden Road and Royal College Street), illustrated in the photomontage shown in Figure LV-01-010 (Volume 2, CFA2 Map Book,) will not be significantly affected. The 19th century column will be replaced and the bridge design will allow the reinstatement of the landmark lettering scheme. There will be higher OLE and trains on the bridge but in the context of the railway corridor, none of these will appear as new features in the view. This reported in Volume 5: Appendix LV-001-003 Part 4.

Viewpoint 004.2.020: View south-west from Randolph Street

9.5.14 Ten 19th century iron columns will be removed and not replaced under the bridge. Their loss will detract from the historic character and interest of the view. The utilitarian design of the new bridge will replace the existing, similarly utilitarian-looking bridge. The new OLE will be higher than the existing lines but there will be no new features in the view. Classic trains serving the NLL will now run along the currently vacant lines on the north side of the viaduct, making them more prominent in the view. Overall, there will be a loss of a key characteristic of the view and other changes, largely characteristic of the existing view, a short distance from receptors. Therefore, the magnitude of change is considered to be medium.

9.5.15 The medium magnitude of change, assessed alongside the high sensitivity of the receptor, will result in a noticeable deterioration in the existing view, and therefore a moderate adverse effect in the winter of year 1 of operation.

9.5.16 The view of the project from this location during operation is illustrated on the photomontage shown in Figure LV-01-007 (Volume 2, CFA2 Map Book).

9.5.17 In summer, the bridge abutments will be partially screened by vegetation. However the additional screening effect will not change the assessment during summer.

9.5.18 The limited scope for planting in this section of the Proposed Scheme means operational effects will remain unchanged in years 15 and 60 compared to year 1.

Viewpoint 004.4.023: View north-east from Randolph Street

9.5.19 Ten 19th century iron columns will be removed and not replaced under the bridge. Their loss will detract from the historic interest of the view. The utilitarian design of the new bridge will replace the existing, similarly utilitarian-looking bridge. The OLE will be higher than the existing lines and the HS1 trains taller than other trains using the line but there will be no new features in the view. Overall, there will be a loss of a key characteristic of the view and other changes, largely characteristic of the existing view, visible a short distance from receptors. Therefore, the magnitude of change is considered to be medium.

9.5.20 The medium magnitude of change, assessed alongside the medium sensitivity of the receptor, will result in a noticeable deterioration in the existing view and therefore a moderate adverse effect in the winter of year 1 of operation.

9.5.21 In summer, the bridge abutments on the east side of the road will be partially screened by vegetation. However, the additional screening effect will not change the assessment.

9.5.22 The limited scope for planting in this section of the Proposed Scheme means that operational effects will remain unchanged in years 15 and 60 compared to year 1.

Viewpoint 004.1.034: View south-east from Kentish Town Road/Jeffrey's Street Junction

9.5.23 The bridge over Camden Street will be retained with external walkways cantilevered out along part of the bridge parapet. The bridge over Kentish Town Road will be widened on the north side with concrete arches resting on brick faced piers. The addition of walkways to the Camden Street Bridge will result in a small alteration to the view.

9.5.24 The design for the widening of the Kentish Town Road Bridge is not in character with the existing 19th century brick arch and will result in an alteration to a key characteristic of the view. The OLE will be higher than the existing lines, the HS2 trains will be taller than the trains currently using the line and trains will run along new tracks on the northern side of the bridges and viaduct. However in the context of the railway corridor, none of these will appear as new features in the view.

9.5.25 Three semi-mature trees will be lost from the centre of Camden Gardens but the mature trees growing around the perimeter, which largely screen the viaduct from view in summer, will be retained. The semi-mature trees will be replaced at the end of the construction period. Overall the magnitude of change is considered to be medium.

9.5.26 The winter view of the project from this location during year 1 of operation is illustrated on the photomontage shown in Figure LV-01-009 (Volume 2, CFA2 Map Book).

9.5.27 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.

9.5.28 In summer, the viaduct and the bridge abutments will be screened by vegetation growing in Camden Gardens. However, the additional screening effect will not change the assessment during summer.

9.5.29 The limited scope for planting in this section of the Proposed Scheme means that operational effects will remain unchanged in years 15 and 60 compared to year 1.

Cumulative effects

9.5.30 Volume 5: Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the baseline for the operation of the Proposed Scheme. The consequential cumulative effect of these committed developments on LCA and viewpoints is described below. These developments are shown in Maps CT-13-002 to CT-13-003a (Volume 5, Cross Topic Appendix 1 Map Book).

9.5.31 There are a number of mixed use and residential developments proposed within the study area which it is assumed would be built and occupied by year 1 (2026). They include developments in the Maiden Lane Estate, off the A5200 York Way in the Kings Cross Opportunity Area, at the corner of Bonny Street and the A503 Camden Road, at Delancey Street, at Hawley Wharf (between the A502 Chalk Farm Road, Castlehaven Road, the A502 Hawley Road, the A400 Kentish Town Road and the Regent's Canal) and at the corner of Buck Street and Stucley Place. The developments at King's Cross and Hawley Wharf would result in enhancement of their immediate surroundings, but there would be no change to the overall sensitivity of LCA. The committed developments would largely replace existing development of a similar type and use and consequently, though the new buildings would have a different appearance from the buildings they replace, they would not alter the character of the view.

9.5.32 None of the LCA or visual receptors would be significantly affected by the operation of the Proposed Scheme when considering the combined presence of operational activity from nearby developments.

Other mitigation measures

9.5.33 The permanent effects of the Proposed Scheme on landscape and visual receptors have been reduced through incorporation of the measures described previously. Effects in the operational phase may be further reduced through development of the design of new bridges and structures, which will considered during the detail design

stage. However, no other mitigation measures are considered practicable due to the visibility of elements of the Proposed Scheme and the sensitivity of the surrounding receptors.

Summary of likely residual significant effects

9.5.34 Due to the lack of planting possible within this urban area, significant effects identified in year 1 of operation will persist through to year 15 and beyond to year 60. Therefore, the following residual effects will remain:

- adverse effects on the character of Camden Road Station, the Viaduct and 19th Century Residential LCA, and Camden Markets LCA due to the widening of viaducts, introduction of taller trains and OLE, and the removal of characteristic features within the areas;
- adverse effects on the protected view from Kentish Town Road/Jeffrey's Street Junction (004.1.034) arising from changes to the Kentish Town Road Bridge; and
- adverse effects on residential receptors on Randolph Street (004.2.020) and people travelling along Randolph Street (004.4.023) arising from changes to the existing bridge including removal of ten 19th century iron columns.

10 Socio-economics

10.1 Introduction

10.1.1 This section reports on the likely significant economic and employment effects during the construction and operation of the Proposed Scheme.

10.1.2 The need for a socio-economic assessment results from the potential for the Proposed Scheme to affect:

- existing businesses and community organisations and thus the amount of local employment;
- local economies, including employment; and
- planned growth and development.

10.1.3 The beneficial and adverse socio-economic effects of the Proposed 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. Localised effects on businesses and observations on potential local economic effects are reported within each CFA report.

Construction

10.1.4 The proposed construction works will have the following relevance in terms of socio-economics in relation to:

- premises demolished, with their occupants and employees needing to relocate to allow for construction of the Proposed 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 CFA).

Operation

10.1.5 The operation of the Proposed Scheme will have relevance in terms of socio-economics in relation to potential employment opportunities created by new business opportunities.

10.1.6 Engagement with stakeholders and community organisations, including LBC, has been undertaken with regard to socio-economic resources that may be impacted by the Proposed Scheme.

10.2 Scope, assumptions and limitations

10.2.1 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)

and the SMR Addendum (Volume 5: Appendix CT-001-000). This report follows the standard assessment methodology.

10.3 Environmental baseline

Existing baseline

Study area description

10.3.1 Section 2 of this report provides a general overview of the Camden Town and HS1 Link 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 area[81].

10.3.2 The Camden Town and HS1 Link area lies almost wholly within the LBC with the exception of a small section at the eastern end which is within the administrative boundary of the LBI[82]. Camden Town is an economically vibrant town centre area, known for its markets, creative and cultural activities, and music and entertainment venues but also containing a large residential population. It is well connected and forms a focal point in inner London's transport system making it a popular location both to live and to do business.

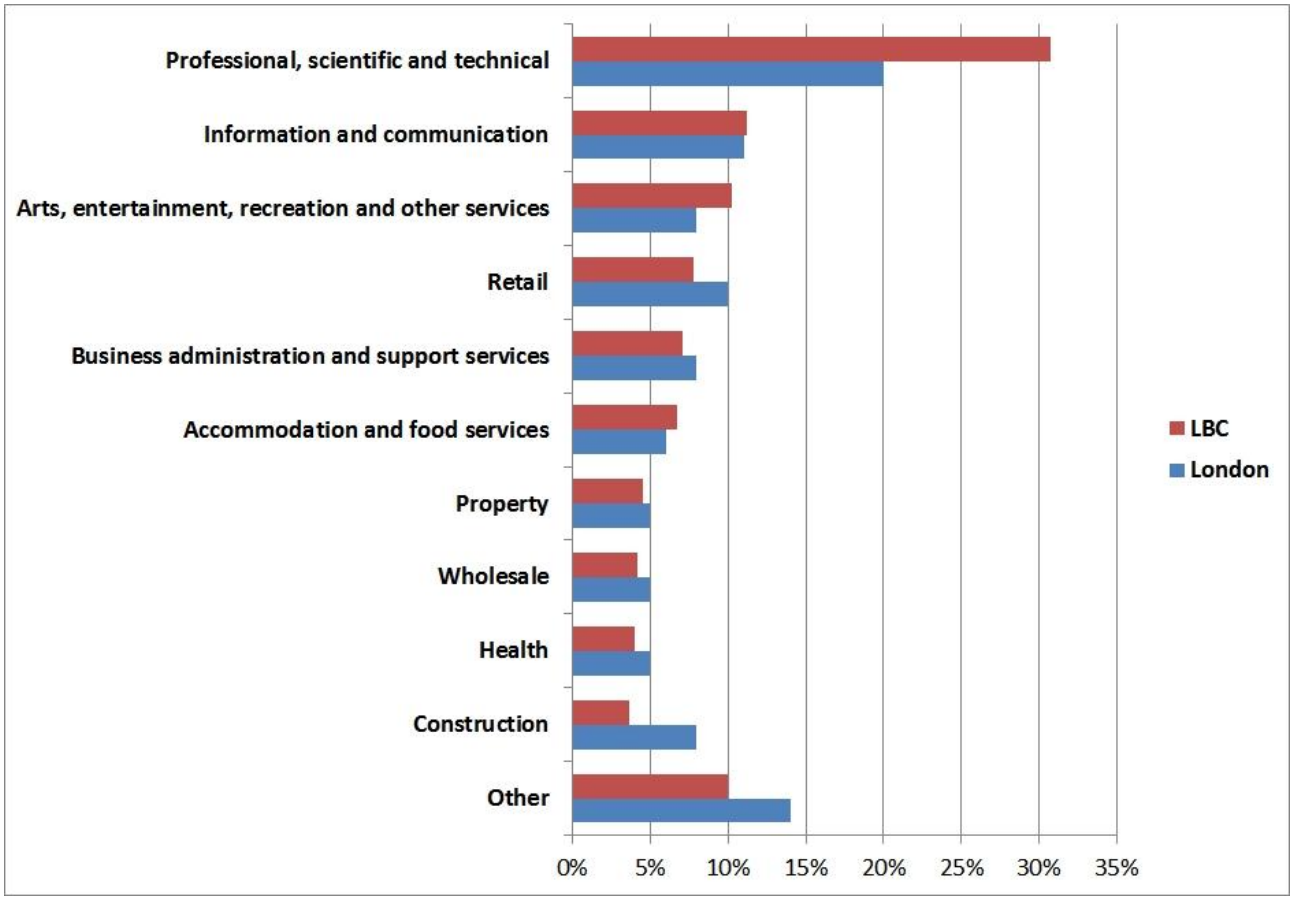
10.3.3 Where possible, baseline data has been gathered on demographic character areas (DCA)[83] to provide a profile of local communities. Volume 5: Appendix SE-02-001 shows the location of these DCA. The area contains two DCA – Camden Town West and Camden Town East.

Business and labour market

10.3.4 Within the LBC there is a wide spread of business types reflecting a diverse range of commercial services. The professional, scientific and technical services sector accounts for the largest proportion of businesses (31%), 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 7[84]. For comparison within London the professional, scientific and technical services sector accounts for the largest number of businesses (20%), with the information and communication (11%), retail (10%), and arts, entertainment, recreation and other services (8%) sectors also accounting for relatively large numbers of businesses[85].

[81] Further information on the socio-economics baseline, with regard to business and labour market profile within the area, are presented in Volume 5: Appendix SE-001-000.
[82] A description of the wider socio-economic statistics relating to Islington as a borough has not been included due to the very small area involved.
[83] 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).
[84] The Figure presents the proportion of businesses within each business sector in the borough but not the proportion of employment by sector.
[85] Office for National Statistics (ONS) (2012), *UK Business: Activity, Size and Location 2011*. Please note 2011 data has been used to provide an appropriate comparison with 2011 Census data.

Figure 7: Business sector composition in the LBC and London[86,87]



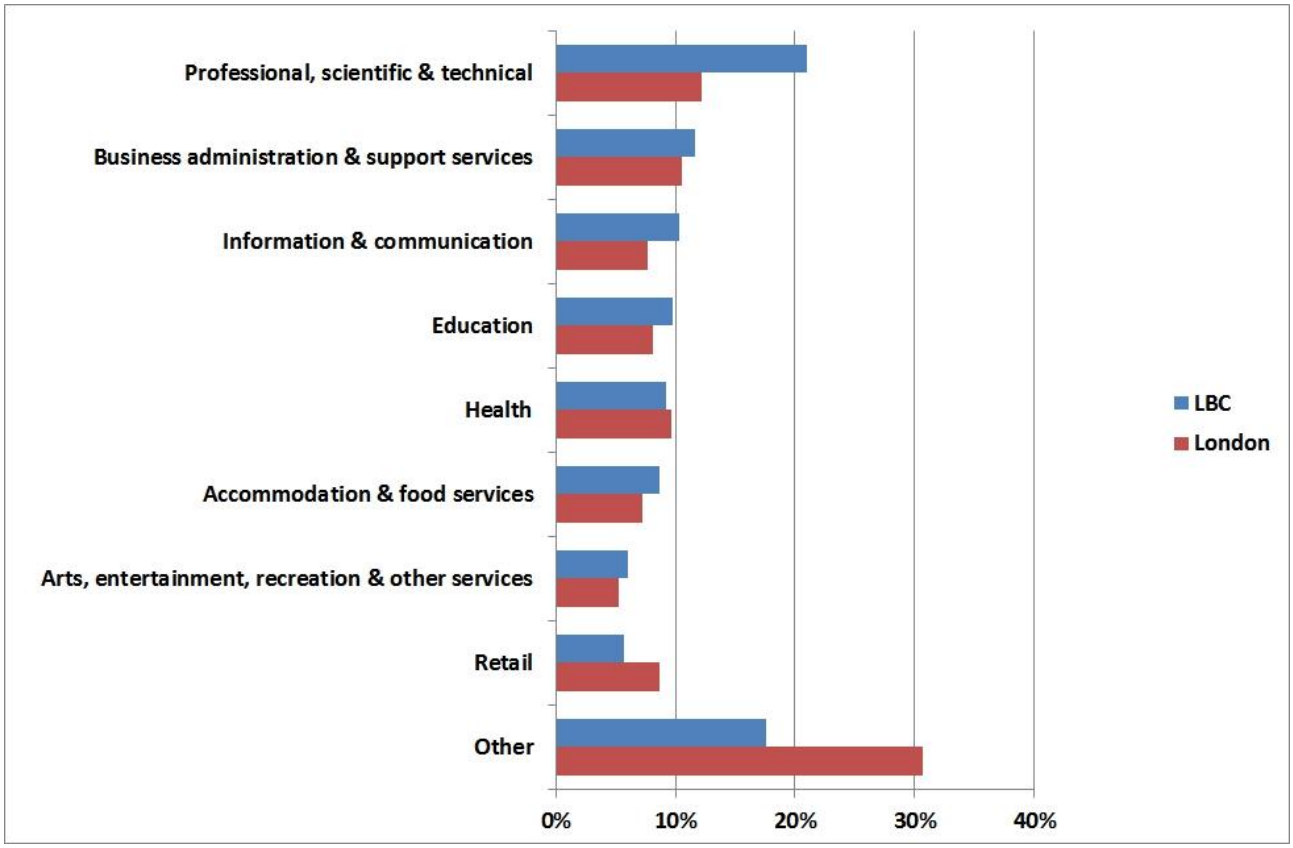
10.3.5 Approximately 291,000 people worked in the LBC, while 10,000 people worked within Camden Town West DCA and 7,000 within Camden Town East DCA[88].

10.3.6 According to the ONS Business Register and Employment Survey 2011, the sector with the highest proportion of employment in the LBC 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 8.

10.3.7 Key sectors for Camden Town West DCA are information and communication (16%), retail (16%), accommodation and food services (16%) and professional, scientific and technical (13%). For Camden Town East DCA, key sectors are professional, scientific and technical (37%) and health (30%).

[86] 'Other' includes agriculture, forestry and fishing, production, motor trades, transport and storage (including postal), finance and insurance, public administration and defence; and education sectors.
[87] ONS (2012), *UK Business: Activity, Size and Location 2011,* ONS, London.
[88] ONS (2012), *Business Register and Employment Survey 2011*, ONS, London.

Figure 8: Proportion of employment by industrial sector in the LBC and London[89,90]



10.3.8 According to the 2011 census[91], the employment rate[92] within the LBC in 2011 was 63% (109,000 people) which is in line with that recorded for both London and England (both 65%). The employment rate in the Camden Town West DCA was 63% and 55% in Camden Town East DCA.

10.3.9 The unemployment rate for the LBC in 2011 stood at 8% slightly higher than the England average of 7%. The unemployment rate was 9% in Camden Town West DCA, slightly less than the 11% recorded within Camden Town East DCA[93].

10.3.10 According to the 2011 census, 51% of LBC residents aged 16 and over were qualified to National Vocational Qualification Level 4 (NVQ4), compared with 38% in London and 27% in England, whilst 13% had no qualifications, which is lower than the percentage recorded both for London (18%) and England (23%). In 2011 46% of Camden Town West DCA residents aged 16 and over were qualified to NVQ4 level, compared with 37% in Camden Town East DCA. The proportion of residents with no qualifications was 14% in Camden Town West DCA and 19% in Camden Town East DCA.

[89] 'Other' includes agriculture, forestry and fishing, production, construction, motor trades, wholesale, transport and storage, financial and insurance, property and public administration and defence sectors.
[90] ONS (2012), *Business Register and Employment Survey 2011*, ONS, London.
[91] ONS (2012), *Census 2011, ONS, London.*
[92] The proportion of working age (16-74 years) residents that is in employment. Employment comprises the proportion of the total resident population who are 'in employment' and includes full-time students who are employed.
[93] Unemployment figures have been rounded to nearest whole number. DCA unemployment rates are presented for each DCA in this chapter while in Section 2 they are shown in aggregate.

10.3.11 Camden Town West DCA and Camden Town East DCA each contain a mix of residential and commercial uses. Camden Town West contains the commercial/mixed-use core of Camden Town (a 'major centre' in The London Plan), with Camden Town East including industrial/warehousing employment areas at Camley Street/A5202 St Pancras Way of an older character, as well as part of the former goods yard north of King's Cross. In terms of socio-economic indicators, Camden Town West has an employment rate similar to LBC, and an unemployment rate which is above LBC, London and England averages. Camden Town East experiences a lower rate of employment and higher unemployment rate when compared to LBC, London and England. Both of the DCAs have lower proportions of well-qualified residents, and higher proportions of residents with no qualifications when compared to LBC, though these rates compare favourably against the corresponding national averages.

Property

10.3.12 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[94]. Overall, this suggests low availability of alternative accommodation.

10.3.13 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.

Future baseline

Construction (2017)

10.3.14 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2017.

10.3.15 Implementation of all outstanding development consents and land allocations will result in up to 1,000 additional jobs being accommodated by 2017. This includes at Hawley Wharf where proposals include retail, café/restaurant, and assembly and leisure (gallery and cinema) uses.

10.3.16 The existing composition and numbers of employers, employees and economic sectors in the area is likely to change over time in ways that cannot be accurately forecast.

Operation (2026)

10.3.17 Volume 5: Appendix CT-004-000 provides details of the developments which are assumed to have been implemented by 2026. There are no consents or allocations in this area which are expected to accommodate additional material employment between 2017 and 2026.

[94] 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).

10.4 Effects arising during construction

Avoidance and mitigation measures

10.4.1 In order to avoid or minimise the environmental impacts during construction, the Proposed Scheme design includes provisions to maintain access to businesses during the construction phase.

10.4.2 The draft CoCP includes a range of provisions that would help mitigate the socio-economic effects associated with construction within this local 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 the sensitive layout of construction sites (draft CoCP, Section 5);
- applying best practicable means (BPM) during construction works to reduce noise (including vibration) at sensitive receptors (including local businesses) (draft CoCP, Section 13);
- requiring contractors to monitor and manage flood risk and other extreme 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

10.4.3 Businesses within the Camden Town and HS1 Link area may experience air quality, noise and vibration, visual or construction traffic impacts as a result of the construction of the Proposed 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.

10.4.4 There are three businesses on the A502 Chalk Farm Road which may experience likely significant noise, visual and construction traffic residual effects as a result of the establishment of construction compounds and structure works relating to the proposed Chalk Farm Road Bridge and viaduct works. These businesses are Porky's BBQ restaurant and bar, Inhabition coffee shop and Thanh Binh restaurant. The sensitivity of these establishments is deemed to be high, as users are considered to be susceptible to changes in amenity, and construction work may discourage customers, including passing trade. Due to the relatively short-term period of noise effects, these three in-combination effects will occur over nine months. The in-combination effect of visual and construction traffic effects will last longer and occur over a period of four

years. Given the high level of sensitivity, the Proposed Scheme is assessed to have a significant amenity effect on these businesses.

10.4.5 Any resulting effects on employment are reported in aggregate at a route-wide level (Volume 3).

Isolation

10.4.6 Businesses within the Camden Town and HS1 Link area may experience significant isolation effects as a result of the construction of the Proposed Scheme. As a consequence, this could lead to a loss of trade for the affected businesses.

10.4.7 Construction works in Camden will involve replacement of bridges and widening of viaducts. Work at Chalk Farm Road Bridge will involve the demolition and replacement of the bridge, widening of the bridge abutments and works to the viaduct. Located in the vicinity of Chalk Farm Road Bridge are Camden's main markets: Camden Lock Market, Stables Market and Camden Lock Village Market. These markets include over 1,000 shops and stalls selling a range of products including clothes, crafts, furniture and food, attracting visitors and tourists from across London and internationally. The markets are open seven days a week and Camden Lock Market alone attracts over 150,000 people a week on average, with visitor numbers considered to be higher at weekends than weekdays[95]. Visitors tend to travel predominantly on foot as the location is well served by public transport and there is limited availability of vehicle parking spaces in the vicinity.

10.4.8 The main entrance to Camden Lock Market is next to Chalk Farm Road Bridge on its south side. The market is adjacent to and links internally with the Stables Market, which can also be accessed from an entrance approximately 60m north of Chalk Farm Road Bridge. Camden Lock Village Market is located on the east side of the A502 Chalk Farm Road opposite Camden Lock Market and is accessible from the A502 Chalk Farm Road, the A400 Kentish Town Road and Castlehaven Road.

10.4.9 At Chalk Farm Road Bridge there will be a three week period of disruption when the road will be closed to allow for the demolition and replacement of the bridge. This period of closure is expected to occur between late December 2019 and early January 2020. During this period a section of the A502 Chalk Farm Road close to the bridge and access to the markets for both pedestrians and vehicles could potentially be closed, though pedestrian access will be maintained, where possible, for the majority of the three week period. Access to businesses located outside the markets, immediately north of Chalk Farm Road Bridge and along Castlehaven Road, will also experience similar disruption.

10.4.10 Aside from this period of closure, pedestrian access to the markets will be maintained. Minor disruption at Camden Lock Market and Camden Lock Village Market may occur

[95] http://www.camdenlock.net/camdenlock/main/main.html. Accessed 2 August 2013.

as a result of the widening of the bridge abutments while scaffolding is erected over the market stalls to gain access to the viaduct and carry out construction works. Some market stall operators in the vicinity of the bridge may suffer some restricted access or a loss of access for a few days while scaffolding is installed. Once the scaffolding has been erected market operators will be able to resume business while the work on the viaduct is carried out over a period of about ten and a half months. During this time the works will occupy the footpaths in front of the abutments for several weeks. As a consequence, pedestrians will be rerouted along a protected walkway in the road during this time to maintain access to the markets and access to the market for delivery vehicles will be disrupted for periods of around a few hours at a time (vehicle access will need to be carefully managed/configured and be agreed with the market operators).

10.4.11 It is acknowledged that there will be disruption to the markets and some businesses in the immediate vicinity of Chalk Farm Road Bridge as a result of construction of the Proposed Scheme. However, customers of the markets, and surrounding retail and entertainment offer, tend to be drawn from a wide catchment area and they are considered unlikely to be deterred from visiting the markets as a result of the construction works especially as for the majority of the construction period, access will be maintained to the markets and they should still, in most cases, continue to be able to operate. Therefore the Proposed Scheme is assessed to not have a significant isolation effect on businesses located in the Camden markets and the surrounding retail and entertainment environment.

10.4.12 There are three smaller markets (Buck Street, Inverness Street and Electric Ballroom) located farther south of the Chalk Farm Road Bridge on the A502 Camden High Street, within 150m of Camden Town London Underground Station. Vehicular or pedestrian access to these markets is not expected to be affected during the construction phase and as a result there will be no significant isolation effects on businesses located at these markets.

10.4.13 There are construction works planned to bridges and viaducts crossing roads including Baynes Street, the A503 Camden Road, the A400 Camden Street, Camley Street, the A400 Kentish Town Road, Leybourne Road, Prowse Place, Randolph Street, Royal College Street, the A5202 St Pancras Way. As a consequence of these bridge works there are anticipated to be road closures (partial or full) over a short time period. This is expected to be no longer than approximately three months. However, access for vehicles and pedestrians is expected to be maintained over the majority of the construction period.

10.4.14 Any resulting effects on employment are reported in aggregate at a route-wide level (Volume 3).

Construction employment

10.4.15 There are plans to locate construction compounds for the Proposed Scheme at locations within the Camden Town and HS1 Link area, including Camley Street main compound.
These locations are set out in Section 2 of this report.

10.4.16 The use of these sites could result in the creation of up to 900 person years of construction employment[96] opportunities, or approximately 90 full-time equivalent jobs[97], which, depending on skill levels required and the skills of local people, are potentially accessible to residents in the locality and to others living further afield. The impact of the direct construction employment creation has been assessed as part of the route-wide assessment (see Volume 3).

10.4.17 Direct construction employment created by the Proposed Scheme could also lead to opportunities for local businesses to supply the project or to benefit from expenditure of construction workers. The impact of the indirect construction employment creation has been assessed as part of the route-wide assessment (Volume 3).

Cumulative effects

10.4.18 No committed developments have been identified that are considered to interact with the Proposed Scheme.

10.4.19 Cumulative effects arise in relation to the accumulation of individual resource based job displacement/losses on a local labour market. These effects are assessed as part of the route-wide assessment (Volume 3).

10.4.20 Combined effects arise where business establishments are affected by other environmental effects (from noise, vibration, air quality, visual and construction traffic) such that their ability to trade is disadvantaged thereby potentially prejudicing jobs in business establishments affected. These effects have been identified earlier in Section 10 and are assessed in the route-wide assessment (Volume 3).

Permanent effects

Businesses

10.4.21 Businesses directly affected, i.e. those that lie within land which will be acquired for the construction of the Proposed 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.

[96] Construction labour is reported in construction person years, where one construction person year represents the work done by one person in a year composed of a standard number of working days.
[97] Based on the convention that 10 employment years is equivalent to one full time equivalent job.

10.4.22 In all, 35 businesses within the Camden Town and HS1 Link area would be directly impacted upon by the Proposed Scheme. These together form 12 defined resources. Four of the resources which experience direct impacts are subject to likely significant effects on business activities and employment. These resources are listed in Table 8.

Table 8: Resources with likely significant direct effects[98]

Resource	Description of business activity
110 Camden Road	Industrial premises accommodating two businesses
120-136 Camley Street	Industrial/warehousing/car servicing units
90-94 Baynes Street and 77-79 and 88 Randolph Street	Industrial/warehousing and car servicing businesses
49 Kentish Road (arches 1-7)	Industrial/warehousing and storage businesses

Impact magnitude

10.4.23 The magnitude of impact focuses on the number of jobs which are affected (either through displacement or possible loss) by the Proposed Scheme. It also considers the implications of this impact in relation to the scale of economic activity and opportunity in the area.

Sensitivity

10.4.24 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

10.4.25 Taking account of the sensitivity of the resource and the magnitude of impact, the significance of the resultant effects is set out in Table 9.

Table 9: Significant effect on resources

Resource	Impact magnitude	Sensitivity	Significance of effect
110 Camden Road	Medium	Medium	Moderate adverse
120-136 Camley Street	Medium	Medium	Moderate adverse
90-94 Baynes Street and 77-79 and 88	Medium	Medium	Moderate adverse

[98] Table 8 lists significantly affected socio-economic resources in the area. Demolitions of commercial properties in the area are described in Section 2.

Randolph Street			
49 Kentish Road (arches 1-7)	Medium	Medium	Moderate adverse

10.4.26 Construction of the Proposed Scheme would require the demolition of light industrial/car servicing accommodation at 120-136 Camley Street. Demolition of warehousing/small business unit accommodation would also be required at 110 Camden Road. Availability of premises of these types within the LBC is constrained (vacancy rates at 2% of total stock).

10.4.27 The effects on these resources and their employees are therefore assessed to be moderate adverse and will therefore be significant.

10.4.28 Construction of the Proposed Scheme will impact on businesses located in viaduct arches or close to bridges which will undergo structural works. These construction works will prevent access to and/or use of take up areas used to operate the business and will render them inoperable. This is expected to occur at the following locations:

- a car servicing business at 90-94 Baynes Street assessed to be not accessible for a period of 10 months due to construction works undertaken within the area used for access and loading in order to reconstruct the Baynes Street Bridge and refurbish the NLL Viaduct;
- industrial/warehousing and car servicing businesses operating from arches on the northern side of the NLL Viaduct at 77-79 Randolph Street and 88 Randolph Street, are assessed to be not accessible for a period of 10 months due to works being undertaken to reconstruct the north side of the Randolph Street bridge and refurbish the arches. The industrial/warehouse unit on the south side of the viaduct at 78 Randolph Street will also be inaccessible for approximately 10 months at a later stage in the construction period, due to works being undertaken to reconstruct the south side of the bridge; and
- industrial/warehousing and storage businesses at 49 Kentish Road (arches 1-7) are assessed to not be accessible for a period of three years and seven months due to works being undertaken to widen and refurbish arches on the Kentish Town Road viaduct, which will absorb the road used to access these businesses.

10.4.29 Following completion of these works, the arches are likely to become available for commercial use again.

10.4.30 It is estimated that land required for the construction of the Proposed Scheme will result in the displacement or possible loss of approximately 130 jobs[99] in the Camden

[99] Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floorspace 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 from actual employment at the sites.

Town and Hs1 Link area. Taking into account the availability of alternative premises, skill levels of local people and the relatively healthy local economy, the displacement or possible loss of jobs is considered to be relatively modest compared to the scale of economic activity and opportunity in the area.

Cumulative effects

10.4.31 No committed developments have been identified that are considered to interact with the Proposed Scheme.

10.4.32 Cumulative effects also 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 (Volume 3).

Other mitigation measures

10.4.33 The above assessment has concluded that there are significant adverse effects arising during construction in relation to businesses directly affected by the Proposed Scheme.

10.4.34 Businesses displaced by the Proposed Scheme will be fully compensated within the provisions of the 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 Proposed Scheme on local businesses

10.4.35 The construction of the Proposed 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 working with its suppliers to build a skilled workforce that fuels further economic growth across the UK.

Summary of likely residual significant effects

10.4.36 Likely significant residual effects are shown on Maps SE-01-003 and SE-01-004a (Volume 5, Socio-economics Map Book).

10.4.37 The Proposed Scheme will require the demolition of, or otherwise render inoperable, four significantly affected socio-economic resources in the area. During construction, customers may be discouraged from using bars cafes/restaurants on Chalk Farm Road as a result of construction works at this location.

10.5 Effects arising during operation

Avoidance and mitigation measures

10.5.1 No mitigation measures are proposed during operation within this area.

Assessment of impacts and effects

Resources with direct effects

10.5.2 There are no resources considered likely to experience significant direct effects during the operational phase of the Proposed Scheme within this area.

Change in business amenity

10.5.3 No businesses have been identified within the area that are expected to experience significant amenity effects as a result of the Proposed Scheme.

Operational employment

10.5.4 Operational employment will be created at locations along the route including stations, train crew facilities and infrastructure/maintenance depots which could be accessed by residents of the area, particularly given its proximity to Old Oak Common and Euston.

10.5.5 Direct operational employment created by the Proposed Scheme could also lead to indirect employment opportunities for local businesses in terms of supplying the project or benefiting from expenditure of directly employed workers on goods and services.

10.5.6 Some of these employment opportunities would be accessible to residents in the locality and, given the transport accessibility of the area, within the London travel to work area and residents living further afield.

10.5.7 The impact of operational employment creation has been assessed as part of the route-wide assessment (see Volume 3).

Cumulative effects

10.5.8 No committed developments have been identified that are considered to interact with the Proposed Scheme.

Other mitigation measures

10.5.9 The assessment has concluded that operational effects within this section of the route will be either negligible or beneficial and therefore mitigation is not needed.

Summary of likely residual significant effects

10.5.10 There are no significant effects identified in this assessment that will arise during operation.

11 Sound, noise and vibration

11.1 Introduction

11.1.1 This section reports the assessment of the likely noise and vibration significant effects arising from the construction and operation of the Proposed Scheme for the Camden Town and HS1 Link 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 areas[100]; 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'[101].

11.1.2 The assessment of likely significant effects from noise and vibration on community, ecological or heritage receptors and the assessment of tranquillity are presented in Sections 5, 6, 7 and 9 of this report respectively.

11.1.3 In this assessment 'sound' is used to describe the acoustic conditions that 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 Proposed Scheme. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

11.1.4 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed 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 Proposed Scheme.

11.1.5 This section sets out the means to avoid or reduce the adverse effects that may occur.

11.1.6 The approaches to assessing sound, noise and vibration and appropriate mitigation are outlined in Volume 1 and scope and methodology are defined in the following documents:

- SMR (Appendix CT-001-000/1); and
- SMR Addendum (Appendix CT-001-000/2).

[100] '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.

[101] Quiet areas are defined in the Scope and Methodology Report as either Quiet Areas as identified under the Environmental Noise Regulations or are resources which are prized for providing tranquillity (further information is provided in Section 9) .

11.1.7 More detailed information and mapping regarding the sound, noise and vibration assessment for Camden Town and HS1 Link is available in the relevant appendices in Volume 5:

- sound, noise and vibration, route-wide assumptions and methodology (Appendix SV-001-000);
- sound, noise and vibration baseline (Appendix SV-002-002);
- sound, noise and vibration construction assessment (Appendix SV-003-002);
- sound, noise and vibration operation assessment (Appendix SV-004-002); and
- Map Series SV-01, SV-02, SV-03 and SV-04 (Volume 5, Sound, Noise and Vibration Map Book).

11.2 Environmental baseline

Existing baseline

11.2.1 The existing baseline sound environment for this area is typical for a central London urban environment with significant contributions from the existing rail sources and roads, notably the A502 Chalk Farm Road/Camden High Street, the A400 Kentish Town Road, the A503 Royal College Street and the A5202 St Pancras Way.

11.2.2 As with the majority of central London, even on less-frequented side roads there is a fairly constant level sound from road traffic, which means that baseline levels tend to remain relatively high in most locations. Sound levels are typically high at receptors located close to busy roads, where daytime sound levels are typically around 70dB[102], however, due to the screening provided by buildings and other obstacles sound levels are typically around 10dB lower on side roads away from main traffic routes.

11.2.3 Night-time sound levels in this area are typically 3 to 4dB[103] lower than those during the day in locations where the sound environment is dominated by busy main roads; and 5 to 7dB lower in locations away from the main roads.

11.2.4 Further information on the existing baseline, including baseline sound levels and baseline monitoring results, is provided for this area in Volume 5: Appendix SV-002-002.

11.2.5 It is likely that the majority of receptors adjacent to the line of route are not currently subject to appreciable vibration, save for those receptors closest to existing railways. From engagement with the local community it is understood that some freight train movements along the existing North London Line (NLL) generate perceptible vibration in dwellings adjacent to the line.

[102] Quoted dB values at residential areas refer to the free-field 16 hour daytime (07:00 to 23:00) equivalent continuous sound pressure level, $L_{pAeq,16hr}$.
[103] Night-time sound levels refer to the free-field 8 hour night-time (23:00 to 07:00) equivalent continuous sound pressure level, $L_{pAeq,8hr}$.

11.2.6 On a precautionary basis, vibration from the Proposed Scheme has therefore been assessed at all receptors using specific thresholds, below which receptors will not be adversely affected by vibration from the Proposed Scheme, as described in Volume 1, Section 8. No vibration baseline measurements have therefore been undertaken.

Future baseline

11.2.7 Without the Proposed 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 roads[104], tyre sound dominates and hence the expected growth in traffic is likely to continue to increase ambient sound levels.

Construction (2017)

11.2.8 The assessment of noise from construction activities assumes a baseline year of 2017 which represents the period immediately prior to the start of the construction period. 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 the future baseline year of 2017. The assessment of noise from construction traffic assumes a baseline year of 2021, representative of the middle of the construction period when the construction traffic flows are expected to be at their peak. Further information can be found in Section 12.

Operation (2026)

11.2.9 The assessment is based upon the predicted change in sound levels that result from the Proposed Scheme. The assessment initially considered a worst case (that would overestimate the change in levels) by assuming that sound levels would not change from the existing baseline year of 2012/2013. Where significant effects were identified on this basis, the effects have been assessed using a baseline year of 2026 to coincide with the proposed start of passenger services. The future baseline is for the sound environment that would exist in 2026 without the Proposed Scheme.

11.3 Effects arising during construction

Local assumptions and limitations

Local assumptions

11.3.1 The construction arrangements that form the basis of the assessment are presented in Section 2.3 of this report.

11.3.2 Some construction activities around the HS1-HS2 Link tunnel portal will need to be undertaken during the evening and night-time for reasons of safety, engineering practicability or to reduce the impact on existing transport.

[104] Tyre noise typically becomes the dominant sound source for steady road traffic at speeds above approximately 30mph.

11.3.3 The assessment takes account of people's perception of noise throughout the day. More stringent criteria are applied during evening and night-time periods, when people are more sensitive to noise, compared to the busier and more active daytime period.

Local limitations

11.3.4 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 Volume 5: Appendix SV-002-002.

Avoidance and mitigation measures

11.3.5 The assessment assumes the implementation of the principles and management processes set out in Section 13 of the draft CoCP which are:

- Best Practicable Means (BPM) as defined by the Control of Pollution Act 1974 (CoPA) and Environmental Protection Act 1990 (EPA) 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[105]; 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 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

[105] Warning signals that consist of bursts of noise.

- 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.

11.3.6 In addition to this mitigation, taller screening as described in the draft CoCP[106] has been assumed along edge of the construction site boundary at the following locations:

- on the viaduct adjacent to dwellings between the A400 Kentish Town Road and the A5202 St Pancras Way and offices in Bruges Place;
- along the edge of the construction site boundary of Camley Street main site adjacent to dwellings on Barker Drive, Agar Grove, St Paul's Crescent and Springbank Walk;
- along the edge of the construction site boundary adjacent to the dwellings close to Chalk Farm Road Bridge;
- on the viaduct adjacent to Charles Grey London, offices located on Castlehaven Road;
- along the edge of the construction site boundary adjacent to dwellings on Regents Park Road and the Roundhouse close to the HS1-HS2 link tunnel portal; and
- along the edge of the construction site boundary adjacent to the dwellings on A400 Kentish Town Road close to Camden Street Bridge.

11.3.7 Noise insulation will be offered for qualifying buildings as defined in the draft CoCP's Noise Insulation and Temporary Re-housing Policy. Noise insulation or ultimately temporary re-housing will avoid residents being significantly affected[107] by levels of construction noise inside their dwellings.

11.3.8 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 installed, or temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria. Noise insulation, where required, will be installed as early as possible to reduce internal sound levels from construction activities and also when the Proposed Scheme comes into operation.

11.4 Assessment of impacts and effects

Residential receptors: direct effects – individual dwellings

11.4.1 Taking account of the avoidance and mitigation measures set out in the previous paragraphs, approximately 34 residential buildings are forecast to experience noise

[106] 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.
[107] Information is provided in the emerging National Planning Practice Guidance – Noise http://planningguidance.planningportal.gov.uk, e.g. the table summarising the noise exposure hierarchy.

levels higher than the noise insulation trigger levels as defined in the draft CoCP. For daytime construction the trigger level is 75dB[108] measured outdoors, or the existing ambient if this is already above this level. The equivalent night-time trigger level is 55dB, or the existing ambient if this is already above this level[109]. The buildings previously referred to in this paragraph are as follows:

- one building (two dwellings) on Castlehaven Road;
- 16 buildings (32 dwellings) on the A503 Camden Road;
- two buildings (12 dwellings) Baynes Street;
- six buildings (six dwellings) on Randolph Street;
- one building (11 dwellings) on Wrotham Road;
- five buildings (10 dwellings) on A502 Chalk Farm Road;
- one building (two dwellings) on Agar Grove;
- one building (62 dwellings) on Juniper Crescent; and
- one building (10 dwellings) on Regents Park Road.

11.4.2 The mitigation measures, including noise insulation, will reduce noise inside all dwellings, such that it does not reach a level where it would significantly affect[107] residents.

Residential receptors: direct effects – communities

11.4.3 The avoidance and mitigation measures in this area will avoid airborne construction noise adverse effects[107] on the majority of receptors and communities. Residual temporary noise or vibration effects are identified later in this section.

11.4.4 With regard to noise outside dwellings, the assessment of temporary effects takes account of construction noise relative to existing sound levels.

11.4.5 In locations with lower existing sound levels[110], construction noise adverse effects[107] 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 context[111].

11.4.6 The direct adverse construction noise effects[107] on the areas of the residential communities identified in Table 10 are considered to be significant.

[108] $L_{pAeq,0800-1800}$ measured at the facade, outdoors, or the existing ambient if this is already above this level.
[109] $L_{pAeq,2200-0700}$ measured at the façade, outdoors, or the existing ambient if this is already above this level.
[110] Further information is provided in Volume 5: Appendix SV-001-000.
[111] Further information is provided in SV-001-000 and SV-003-002.

Table 10: Adverse effects of construction noise and vibration that are considered to be significant on a community basis

Significant effect number (see Volume 5 Appendix SV-003-002)	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed duration of impact and details
CSV02-C01	Construction noise	Daytime	Approximately 60 dwellings on the A503 Camden Road.	Camden Road North bridge – site preparation, works with typical and highest monthly noise levels of 70dB and 80dB[112].	one month
CSV02-C02	Construction noise	Daytime	Approximately 75 dwellings on Baynes Street, A5202 St Pancras Way and Wrotham Road.	NLL Viaduct – site preparation, substructure and finishes works with typical and highest monthly noise levels of 67-68dB and 77-79dB.	one to seven months
CSV02-C03	Construction noise	Daytime	Approximately nine dwellings on Randolph Street.	NLL Viaduct – site preparation, substructure and finishes works with typical and highest monthly noise levels of 66dB and 78dB.	three months to one year
CSV02-C04	Construction noise	Daytime	Approximately 20 dwellings on A502 Chalk Farm Road.	Chalk Farm Road bridge – site preparation, substructure and finishes with typical and highest monthly noise levels of 81dB and 83dB	nine months
CSV02-C05	Construction noise	Daytime	Approximately 15 dwellings on Agar Grove.	Camley Street main site – building demolition with typical and highest monthly noise levels of 70 – 76dB and 73 – 79dB.	four months
CSV02-C06	Construction noise	Daytime	Approximately eight dwellings on the A400 Kentish Town Road.	Camden Street bridge – site preparation and substructure.	four months

[112] Daytime: equivalent continuous sound level at the facade, $L_{pAeq, 0700-1900}$.

Significant effect number (see Volume 5 Appendix SV-003-002)	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed duration of impact and details
CSV02-C07	Construction noise	Daytime	Approximately 120 dwellings on Juniper Crescent.	HS1-HS2 Link tunnel portal piling and diaphragm wall construction with typical and highest monthly noise levels of 88dB and 89dB.	seven months
CSV02-C08	Construction noise	Daytime	Approximately 20 dwellings on Regent's Park Road.	HS1-HS2 link Tunnel Portal piling and diaphragm wall construction with typical and highest monthly noise levels of 73dB and 77dB.	six months
CSV02-C09	Construction Noise	Daytime	Approximately 20 dwellings on Hawley Road	Demolition of adjacent residential block at Hawley Wharf.	six months

Residential receptors: indirect effects

11.4.7 Significant noise effects on residential receptors arising from construction traffic are unlikely to occur in this area.

Non-residential receptors: direct effects

11.4.8 On a worst case basis, significant construction noise or vibration effects have been identified on the following non-residential receptors:

- offices in Bruges Place located Baynes Street (CSV02-N01). Significant noise effects[113] have been identified during the daytime with noise levels rising at times to 79dB[114] over a period of approximately 3 months in 2021 during the construction of the Randolph Street Bridge;
- shops located along Chalk Farm Road (CSV02-N02). Significant noise and vibration effect has been identified during the daytime with noise levels rising at times to 85dB over a period of approximately 9 months in 2020 during the construction of the Chalk Farm Road Bridge;
- offices located on Castlehaven Road (CSV02-N03). Significant noise and vibration effect has been identified during the daytime with noise levels rising at times to 84dB over a period of approximately 3 months in 2018 during the construction of the Chalk Farm Viaduct;

[113] Activity disturbance, especially for activities that require good conditions for verbal communication.
[114] Equivalent continuous sound level at the facade, $L_{pAeq, 0700-1900}$.

- The Roundhouse located on the A502 Chalk Farm Road (CSV02-N04). Significant noise and vibration effect has been identified during the daytime with noise levels rising at times to 83dB over a period of approximately 6 months in 2017 during the construction of the HS1-HS2 Link tunnel portal; and
- Hawley Primary School (CSV02-N05). Significant noise and vibration effect has been identified during the daytime over a period of approximately 2 months in 2018 during the demolition of a residential block in the Hawley Wharf development.

Non-residential receptors: indirect effects

11.4.9 Significant noise effects on non-residential receptors arising from construction traffic are unlikely to occur in this area.

Cumulative effects from the Proposed Scheme and other committed development

11.4.10 This assessment has considered the potential cumulative construction noise effects of the proposed scheme and other committed developments[115]. In this area, there is no development that would be built at the same time as the Proposed Scheme and accordingly, construction noise or vibration from the Proposed Scheme is unlikely to result in any significant cumulative noise effects.

Summary of likely residual significant effects

11.4.11 The avoidance and mitigation measures reduce noise inside all dwellings from the construction activities such that it is does not reach a level where it would significantly affect[107] residents.

11.4.12 The measures avoid adverse effects from construction noise on the majority of residential communities. Despite the measures, the adverse effects[101] on the following areas of local residential community are considered significant:

- A503 Camden Road, Baynes Street Randolph Street, A5202 St Pancras Way and Wrotham Road;
- A502 Chalk Farm Road in close proximity to the works;
- Agar Grove in close proximity to the works;
- A400 Kentish Town Road in close proximity to the works (including shared the open area at Camden Gardens); and
- Regent's Park Road overlooking the HS1-HS2 Link tunnel portal site.

11.4.13 On a reasonable worst case basis, noise from specific construction activities has been identified as resulting in significant residual temporary effects on commercial

[115] Refer to Volume 5: Appendix CT-004-000.

properties (primarily office accommodation) located in Castlefield Road, Baynes Street and the A502 Chalk Farm Road.

11.4.14 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 reflected in the Environmental Minimum Requirements (see Volume 1 Section 1.4).

11.5 Effects arising during operation

Local assumptions and limitations

Local assumptions – service pattern

11.5.1 The effects of noise and vibration from the operation of the Proposed Scheme have been assessed based on the highest likely train flows, including the 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.

11.5.2 The expected passenger service frequency for both Phase One, and Phase One with Phase Two services are described in Volume 1[116]. As a reasonable worst case, this assessment is based upon the service pattern for Monday to Saturday including 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 trains per hour in each direction on the main lines set out in Table 11. 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 terminus stations by 24.00. Train speeds are shown in Table 11.

Table 11: Train flows and speeds

Description of line	Time period for peak daytime flows	Number of trains per hour in each direction with Phase Two services (Phase One only trains per hour in each direction is set out in brackets)	Speed
HS1-HS2 Link	0700 – 2100 hours	Three (three)	Up to 65kph

Local assumptions – tunnelled sections

11.5.3 Tunnel portals are likely to include mechanical ventilation equipment. It is likely that this equipment will only operate for limited testing periods during the daytime[117], or in the event of an emergency.

[116] The change in noise and vibration effects between the different timetables is assessed in Volume 1.
[117] For example, HS1 vent shaft fans are tested monthly.

Avoidance and mitigation measures

11.5.4 The development of the Proposed Scheme has, as far as reasonably practicable, kept the alignment away from main communities and low in the ground. These avoidance measures have protected many communities from likely significant noise or vibration effects.

Airborne noise

11.5.5 HS2 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 Volume 5: Appendix SV-001-000.

11.5.6 Permanent adverse noise effects are avoided or reduced at dwellings in this study area through the following measures:

- as the alignment emerges from the Hs1-Hs2 Link tunnel, close to Juniper Crescent, incorporated mitigation includes the portal structures, retaining walls and a noise barrier, in the form of the parapet on top of the southern retaining wall, to provide screening to Juniper Crescent;
- on the existing viaduct, incorporated mitigation includes the existing structures (viaduct parapet walls, station structures, etc.) and the solid new parapets proposed as part of the Proposed Scheme at certain locations along the edge of the viaducts; and
- close to Barker Drive, the incorporated mitigation includes the noise fence barrier already provided as part of the Hs1 scheme.

11.5.7 Noise barrier locations are shown in Map Series SV-05 (Volume 2, CFA2 Map Book).

11.5.8 Significant noise effects from the operational static sources such as mechanical ventilation at tunnel portals and line-side equipment will be avoided through their design and the specification of noise emission requirements (for further information please see Volume 5: Appendix SV-001-000).

Ground-borne noise and vibration

11.5.9 Significant ground-borne noise or vibration effects will be avoided or reduce through the design of the track and track-bed for the Proposed Scheme (including replaced track on the NLL).

Assessment of impacts and effects

Residential receptors: direct effects – individual dwellings

11.5.10 The mitigation measures will reduce noise inside all dwellings such that it will not reach a level where it would significantly affect residents.

Residential receptors: direct effects – communities

11.5.11 The mitigation measures in this area will avoid adverse noise effects on the majority of residential community areas along the route of the Proposed Scheme.

11.5.12 Taking account of the envisaged mitigation, Map Series SV-05 (Volume 2, CFA2 Map Book) shows the long term 40dB[118] night-time sound level contour from the operation of trains on the Proposed Scheme. The extent of the 40dB night-time sound level contour is equivalent to, or slightly larger than, the 50dB daytime contour[119]. In general, below these levels adverse effects are not expected.

11.5.13 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 Proposed Scheme. The airborne noise impacts and effects forecast for the operation of the scheme are presented on Map Series SV-05 (Volume 2, CFA2 Map Book).

11.5.14 The changes in noise levels are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life and are considered to be significant when assessed on a community basis taking account of the local context[120].

11.5.15 The direct adverse effects[107] on the areas of the residential communities identified in Table 12 are considered to be significant.

Table 12: 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
OSV02-C01	Airborne noise increase from new train services	Daytime and night-time	Approximately 100 dwellings in the vicinity of Rousden Street, Randolph Street, St Pancras Way, Wrotham Road, Agar Place and Agar Grove. Forecast increases in sound from the railway are likely to cause a minor adverse effect on the acoustic character of the area around the closest properties.

11.5.16 Replacing the track bed and bridges on the NLL as well as improvement works to the viaducts is likely to result in a reduction in the ground-borne vibration currently felt in adjacent dwellings as some freight moves along the line, particularly at night. The Proposed Scheme is also likely to reduce the structure-radiated noise currently generated when existing trains pass over the existing NLL bridges.

Residential receptors: indirect effects

11.5.17 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

[118] Defined as the equivalent continuous sound level from 23:00 to 07:00 or LpAeq,night).
[119] 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 Proposed Scheme would be approximately 10dB higher than the night-time sound level. The 40dB contour therefore indicates the distance from the Proposed Scheme at which the daytime sound level would be 50dB.
[120] Further information is provided in SV-001-000 and SV-004-002.

Non-residential receptors: direct effects

11.5.18 The assessment of operational noise and vibration indicates that significant direct effects on non-residential receptors are unlikely to occur in this area.

Non-residential receptors: indirect effects

11.5.19 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 significant residual effects

11.5.20 The mitigation measures reduce noise inside all dwellings such that it does not reach a level where it would significantly affect[107] residents.

11.5.21 Taking account of the avoidance and mitigation measures and the local context, the residual permanent adverse noise effects[107] are considered significant at the areas of residential community closest to the route on the following roads: Rousden Street, Randolph Street, A5202 St Pancras Way, Wrotham Road, Agar Place and Agar Grove.

11.5.22 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 reflected in the Environmental Minimum Requirements.

11.5.23 Replacing the track bed and bridges serving the NLL as well as improvement works to the viaducts is likely to result in a reduction in the ground-borne vibration currently felt in adjacent dwellings as some freight moves along the line, particularly at night. The Proposed Scheme is also likely to reduce the structure-radiated noise currently generated when existing trains pass over the existing NLL bridges.

12 Traffic and transport

12.1 Introduction

12.1.1 This traffic and transport 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 Proposed Scheme through the Camden Town and HS1 Link area.

12.1.2 With regard to traffic and transport, the main issues relate to increased traffic as a result of implementation of the Proposed Scheme, temporary road diversions, temporary road closures, and temporary closures of pedestrian and cycle routes, particularly within the vicinity of the proposed worksites and compounds.

12.1.3 The effects on traffic and transport have been assessed quantitatively, based on baseline traffic conditions and future projection scenarios.

12.1.4 A detailed report on traffic and transport and surveys undertaken within the area is contained in Volume 5 Appendix: TR-001-000, Transport Assessment.

12.1.5 Figure 2 shows the location of the key transport infrastructure in the area.

12.1.6 Engagement has been undertaken with the key transport authorities including Transport for London (TfL) and LBC.

12.2 Scope, assumptions and limitations

12.2.1 The assessment scope, key assumptions and limitations for the traffic and transport assessment are set out in Volume 1 and in 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.

12.2.2 The study area extends from the A5200 York Way in the east to the Regent's Park Road Bridge in the west, with the Proposed Scheme intersecting the Transport for London Road Network (TLRN) at the A503 Camden Road and the Strategic Road Network at the A400 Kentish Town Road.

12.2.3 A number of transport modelling tools have been used to inform the assessment including TfL's Central London Highway Assignment Model (CLoHAM) for highways. The assessment covers the morning (08:00-09:00 (AM peak) and evening (17:00-18:00 (PM peak) peak periods for an average weekday.

12.2.4 Traffic and transport impacts and effects within the Camden Town and HS1 Link area include those arising from the Euston Station and Approach area (CFA1) and Primrose Hill to Kilburn (Camden) (CFA3) scheme elements, for both the construction and operation scenarios.

12.3 Environmental baseline

Existing baseline

12.3.1 Existing traffic and transport conditions have been determined through site visits, specially commissioned transport surveys, and liaison with LBC and TfL to source transport models, information on public transport, PRoW and accident data.

12.3.2 Traffic surveys of roads crossing the route or potentially affected were undertaken in June/July 2012 comprising junction turning counts, automatic traffic counts, pedestrian counts, parking accumulation surveys and journey time information. All transport modes have been surveyed including private vehicles, public transport, walking, cycling and taxis. This was supplemented by traffic and transport data obtained from other sources where available, including regional and local transport models from TfL. The highway peak hours in the study area were 08:00-09:00 and 17:00-18:00.

12.3.3 PRoW surveys were undertaken in September 2012 to establish the nature of the PRoW and their usage by pedestrians and cyclists (non-motorised users). The surveys included all PRoW, footpaths, permissive paths and roads that will be crossed by the route of the Proposed Scheme, and any affected by the Proposed Scheme. There is one shared pedestrian and cycle permissive path within the Camden Town and HS1 Link area.

12.3.4 There are several strategic routes that pass through the area including the TLRN roads A503 Camden Road and the A400 Camden Street/Camden High Street. The Kentish Town Road section of the A400 forms part of the Strategic Road Network. Due to the dense urban grain and high traffic flows within the Camden Town and HS1 Link area, many of the strategic routes are subject to one way working. There are some height restrictions to the existing bridges in the area.

12.3.5 Survey and model data indicates that the highway network in Camden is heavily congested in peak periods. The TLRN roads of A400 Camden High Street, A503 Camden Road and A400 Camden Street are particularly prone to congestion.

12.3.6 The main local roads affected by the Proposed Scheme are the A5202 St Pancras Way, Baynes Street, Randolph Street, Royal College Street, Prowse Place, Leybourne Road/Torbay Street, Haven Street, Castlehaven Road, A502 Chalk Farm Road, the A502 Camden High Street and the Morrisons supermarket access road (which also serves Juniper Crescent).

12.3.7 Safety and accident data has been obtained from TfL for the period from March 2009 to March 2012. This has been assessed and any identified clusters have been examined. Analysis of accident data revealed that the main clusters occurred at the major junctions in the area, namely:

- at junctions on the A400 Kentish Town Road;
- A503 Camden Road/Royal College Street;
- A400 Camden Street/A503 Camden Road;
- Camden High Street/A400 Kentish Town Road/Camden Road;
- Chalk Farm Road/Camden High Street/Castlehaven Road; and
- A4201 Parkway.

12.3.8 There is a concentration of high frequency and heavily used bus routes (up to 50 buses per hour on some sections) through the area with a number of bus routes serving the streets in and around Camden Town. These services include:

- Route 274 operating between Angel Islington and Lancaster Gate – affected by A5202 St Pancras Way/Baynes Street closure and A503 Camden Road/Royal College Street closure (full closure);
- Route 46 operating between Farringdon Street and Lancaster Gate – affected by A400 Camden Street (partial closure) and A503 Camden Road/Royal College Street (full closure);
- Route 29 operating between Trafalgar Square and Wood Green – affected by A503 Camden Road/Royal College Street (full closure);
- Route 253 operating between Euston and Hackney Central – affected by A503 Camden Road/Royal College Street (full closure);
- Route 24 operating between Pimlico and Hampstead Heath – affected by A400 Camden Street (partial closure) and Chalk Farm Road (full closure);
- Route 27 operating between Chalk Farm Road Morrisons and Chiswick Business Park – affected by A400 Camden Street (partial closure) and Chalk Farm Road (full closure);
- Route 31 operating between Bayham Street and White City Bus Station - affected by A400 Camden Street (partial closure) and Chalk Farm Road (full closure);
- Route 134 operating between Tottenham Court Road and North Finchley – affected by A400 Camden Street (partial closure) and A400 Kentish Town Road (partial closure);
- Route 168 operating between Hampstead Heath and Old Kent Road – affected by A400 Camden Street (partial closure) and Chalk Farm Road (full closure);
- Route C2 operating between Victoria and Parliament Hill Fields – affected by A400 Camden Street (partial closure) and A400 Kentish Town Road (partial closure); and
- Route 214 operating between Moorgate and Highgate Village – affected by A400 Kentish Town Road (partial closure).

12.3.9 Camden High Street northbound between A4201 Parkway and Pratt Street carries the largest volume of buses.

12.3.10 Rail services are accessible via Camden Road Station which is on the NLL and provides services between Richmond/Clapham Junction and Stratford. London Underground services are accessible via Chalk Farm Station and Camden Town Station, both of which are on the Northern Line and provide connections to Edgware, High Barnet and Morden. Camden Town Station (Underground) is the busiest station in the area in terms of station passenger entry and exit flows with up to 20,000 two-way passengers during the morning peak period (07:00-10:00). The Chalk Farm Station (Underground) bus stop is the busiest in the area with around 250 boarders and 200 alighters in the 08:00-09:00 morning peak period.

12.3.11 Parking is generally within controlled parking zones and there are 20mph zones in the area. Parking surveys suggest that within the Camden Town and HS1 Link study area, demand is greatest in the central Camden area.

12.3.12 The Proposed Scheme will pass through the area predominantly via bridge and viaduct structures and will cross over 11 roads with footways in the area.

12.3.13 As well as on the approaches to the stations, pedestrian activity in the vicinity of the Chalk Farm Road railway bridge is high due to the concentration of retail shops and markets.

12.3.14 Several streets in the area form part of the London Cycle Network including Camley Street, Randolph Street, A5202 St Pancras Way, Royal College Street, Pratt Street, Castlehaven Road, Hawley Road and Georgiana Street, Chalk Farm Road and Agar Grove.

12.3.15 The closest waterway is the Regent's Canal which runs parallel to the NLL in an east-west direction.

Future baseline

12.3.16 The forecast future baseline traffic volumes have been incorporated within the TfL CLoHAM model for the future construction and operational years of 2021, 2026 and 2041 and include allowance for planned growth based on the London Plan, including any major locally consented schemes. No substantial additional changes to the traffic and transport baseline are anticipated in the central Camden area.

Construction

12.3.17 Construction activities have been assessed against 2021 baseline traffic flows, irrespective of when they occur during the construction period. Future baseline traffic volumes in the peak hours are forecast to grow by typically 2.5-3.0% by 2021 compared to 2012.

Operation (2026)

12.3.18 Future baseline traffic volumes in the peak hours are forecast to grow by typically 4.5-5.5% by 2026 compared to 2012.

Operation (2041)

12.3.19 Future baseline traffic volumes in the peak hours are forecast to grow by typically 8.5-9.5% by 2041 compared to 2012.

12.4 Effects arising during construction

Avoidance and mitigation measures

12.4.1 The following measures (as described in Section 2) have been included as part of the design of the Proposed Scheme and will avoid or reduce effects on transport users:

- no more than a single full road closure in this area will be implemented at a time;
- road closures will be limited to partial closures wherever reasonably practicable, including maintaining a limited traffic flow (for example, through one-way or shuttle working) or limiting road closures to off peak or weekend periods only;
- advance signage to notify users of alternative routes during construction works;
- the majority of construction employees will arrive on public transport or by staff minibus. The sites will have very limited or no on-site parking;
- HGVs will be routed as far as reasonably practicable along the strategic road network and using designated routes for access, as shown in Maps TR-03-002 to TR-03-003a-R1 (Volume 5, Traffic and Transport Map Book); and
- traffic diversions and the provision of alternative pedestrian and cycle routes and temporary traffic management.

12.4.2 The draft CoCP (see Volume 5: Appendix CT-003-000/1) includes measures which seek to reduce the impacts and effects of deliveries of construction materials and equipment, including reducing construction lorry trips during peak background traffic periods. The draft CoCP includes HGV management and control measures.

12.4.3 Where reasonably practicable, the number of private car trips to and from the site (both workforce and visitors) will be reduced by encouraging alternative modes of transport or vehicle sharing. This will be supported by an over-arching framework travel plan[121] 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

[121] 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.

construction of the Proposed Scheme. As part of this, a construction workforce travel plan will be put into operation with the aim of reducing workforce commuting by private car, especially sole occupancy car travel. This will encourage the use of sustainable modes of transport.

12.4.4 The measures in the draft CoCP will 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 during construction of the Proposed Scheme on or adjacent to public roads, footways and other PRoW affected by the Proposed Scheme as necessary.

12.4.5 Specific measures will include:

- core site operating hours will be 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays. Site staff and workers will therefore generally arrive before the morning peak hour and depart after the evening peak hour (although the assessment has assumed that some work journeys to construction sites will take place within the morning and evening peak hours which is a reasonable worst case scenario) (draft CoCP, Section 5.2); and
- excavated material will be reused wherever reasonably practical along the alignment of the Proposed Scheme which is expected to reduce the effects of construction vehicles on the public highway (draft CoCP, Section 15).

Assessment of impacts and effects

Temporary effects

12.4.6 The following section considers the impacts on traffic and transport and the consequential effects resulting from construction of the Proposed Scheme.

12.4.7 The temporary traffic and transport impacts within this area are expected to be:

- construction vehicle movements to/from the construction compounds;
- impacts resulting from road closures and construction traffic movements related to construction of the Proposed Scheme in the Euston Station and Approach area (CFA1);
- road closures and associated diversions related to utilities diversions and bridge reconstruction works in the area;
- removal of parking and loading at specific locations in the vicinity of the bridge reconstruction works; and
- realignment of a permissive path at Camley Street.

12.4.8 Within the Camden Town and HS1 Link area, the key construction activities in relation to transport impacts will be the replacement of a number of railway bridges over the public highway.

12.4.9 Details of construction compounds are provided in Section 2. The duration of when there will be busy transport activity at each site is shown in Table 13. This represents the periods when the construction traffic flows are expected to be greater than 50% of the peak flows. Also shown is the estimated number of daily vehicle trips during the peak month of activity, the lower end of the range shows the average number of trips in the busy period and the upper end the peak month flows. The assessment scenario has assumed the peak month for the combination of activities, i.e. not necessarily the peak activity at each individual site.

Table 13: Typical vehicle trip generation for construction compounds in this area

Compound type	**Location**	**Access to/from compound**	**Indicative start/setup date**	**Estimated duration of use**	**Estimated duration with busy vehicle movements**	**Average daily combined two-way vehicle trips during busy period and within peak month of activity**	
						Cars/light goods vehicles (LGV)	**HGV**
Main compound and facilities	Camley Street, Camden	Camley Street	2017	Seven years	Seven years	Less than 10	Less than 10
Satellite compound and facilities	North London Line (north)	Camley Street and Wrotham Road	2018	Nine months	Under one month	Less than 10	Less than 10
Satellite compound and facilities	North London Line (south)	Cedar Way and Camley Street	2021	Three years and three months	Under one month	Less than 10	Less than 10
Satellite compound and facilities	St Pancras Way/Baynes Street (north)	St Pancras Way	2018	Seven months	One month	Five to 20	40-60
Satellite compound and facilities	St Pancras Way/Baynes Street (south)	St Pancras Way and Baynes Street	2021	One year	One month	Five to 20	40-60
Satellite compound and facilities	Randolph Street (north)	Randolph Street (via West side of the road junction with St Pancras Way.)	2018	One year	One year six months	5-20	40-60
Satellite compound and facilities	Randolph Street (south)	Randolph Street (via East side of the road junction with Royal College Street.)	2021	One year	One year six months	5-20	40-60

Compound type	Location	Access to/from compound	Indicative start/setup date	Estimated duration of use	Estimated duration with busy vehicle movements	Average daily combined two-way vehicle trips during busy period and within peak month of activity	
						Cars/light goods vehicles (LGV)	HGV
Satellite compound and facilities	Camden Road (north)	Camden Road	2018	Nine months	One month	5- 20	40-60
Satellite compound and facilities	Camden Road (south)	Camden Road/Royal College Street	2022	Nine Months	One month	5- 20	40-60
Satellite compound and facilities	Camden Road Station Viaduct	Prowse Place	2018	Four years and three months	One month	10-20	Zero to five
Satellite compound and facilities	North London Line Viaduct (to Kentish Town)	Kentish Town Road/Torbay Street	2018	Three years six months	One month	5-20	40-60
Satellite compound and facilities	Camden Street Bridge	Camden Street (north of the bridge)	2018	One year	One months	5-20	40-60
Satellite compound and facilities	Chalk Farm Viaduct	Kentish Town Road/Haven Street	2018	Six months	Under one month	5-20	40-60
Satellite compound and facilities	Chalk Farm Road	Chalk Farm Road/ Castlehaven Road	2018	Four years	One year six months	5-20	40-60
Main compound and facilities	HS1 – HS2 Link portal	Regent's Park Road/Morrisons Access Road	2017	Eight years	Nine months	5-20	40-60

12.4.10 Details of the construction phasing are provided in Section 2.3. Construction phasing of works will mean that not all the above movements shown in Table 13 will occur at the same time and the programme of peak construction works at each site will in practice not be simultaneous.

12.4.11 In order to assess the different combinations of enabling works within the Camden Town and HS1 Link area (CFA2), potential impacts arising from utility diversions and construction lorry movements throughout the construction period have been considered for three distinct temporal phases:

- Scenario 1, Quarter 2 (Q2) 2017. This phase corresponds with early enabling work and utilities on the highway network around Euston together with around 70% of the maximum construction traffic arising from construction in the Euston – Station and Approach area (CFA1);
- Scenario 2, Quarter 3 (Q3) 2019. This phase corresponds with the main construction period in CFA1 and the peak month (i.e. the maximum total) of construction traffic, along with works and temporary highway closures at the Chalk Farm Road Bridge (in the Camden Town and HS1 Link area (CFA2)), and the works involving closures of the B509 Adelaide Road in the Primrose Hill to Kilburn (Camden) area (CFA3); and
- Scenario 3, Quarter 4 (Q4) 2021. During this phase, the majority of enabling works on the highway around Euston will be complete, and there will be only short term highway interventions in CFA2.

12.4.12 For each scenario above, there would be different levels of construction traffic, together with different patterns of road closures and traffic management impacting the highway network. The impacts within this area of these scenarios are presented here, with the impacts in other CFAs reported in their respective reports.

12.4.13 As well as the works associated with the two main construction compounds in the area, works at five of the satellite compounds involve construction activities which directly pass over the public highway and which will result in temporary and full road closures requiring diversions for buses and cyclists and alternative routes for pedestrians. This will typically be for weekend periods at each site for bridge replacement works.

12.4.14 The Chalk Farm Road Bridge works and potential road closures are not expected to extend for more than four weeks in duration. However, given the potential importance of this link, Scenario 2 in the assessment has been based on closure at the same time as other works. This approach, in combining it with a closure of the B509 Adelaide Road in CFA3 and traffic and diversionary impacts associated with the construction of the Proposed Scheme in CFA1 is considered to represent the maximum scenario in terms of disruption to the overall highway network in the local area. Highway closures at the Randolph Street worksite are likely to extend for around three months.

12.4.15 It is expected that not more than one main road will need to be closed at any one time. However, with utilities diversions it is possible that this could increase to two partial road closures at any one time. The impact of these partial closures on the local highway network is expected to be minimal.

12.4.16 A reversal of one-way working or conversion from one-way working to two way working (or vice-versa) will be necessary on some roads. Some sections of Baynes Street, Randolph Street, Castlehaven Road, A5202 St Pancras Way and A400 Camden Street will require conversion to two-way working to maintain access and servicing. In

order to implement a short-term bus diversion for route 274, it will also be necessary to convert Randolph Street from one-way working eastbound to one-way working westbound for a period of around four weeks. Some junctions will require physical modification and temporary new permitted turns to be introduced. Local traffic management will minimise local diversionary effects on traffic while these preliminary enabling works are carried out.

12.4.17 Utilities works (including diversions) have been considered in detail where works are expected to be major and where the traffic and transport impacts from the works separately, or in combination with other works, is greater than other construction activities arising within the area. More minor utility works and associated traffic management measures are expected to result in localised traffic and pedestrian diversions only that will be short term durations. Utility works are not expected to result in significant additional adverse effects.

12.4.18 Construction vehicle movements required to construct the Proposed Scheme in this area will include the delivery of plant and materials, movement of excavated materials and site worker trips. In the busiest month these movements are not expected to exceed 30 vehicles (60 total combined in/out movements) per day/per site across the study area which is small in comparison to the wider area traffic flows. The split of construction vehicles is expected to be around 80% HGV and 20% LGV and cars.

12.4.19 The majority of tunnelling activities will be managed at Old Oak Common (see CFA4 Report). However, there will be movement of some excavated material via the HS1-HS2 Link portal main compound during normal working hours as discussed in Section 2.3.

12.4.20 It is envisaged that the A40/A41/B509 Adelaide Road/A502 Chalk Farm Road will provide the primary HGV access routes for the construction compounds.

12.4.21 There will be temporary full and partial road closures for the purpose of bridge replacement works on the following roads:

- A5202 St Pancras Way/Baynes Street – full closure for less than four weeks total duration;
- Randolph Street – full closure for around three months and partial closure for around three months total duration;
- A503 Camden Road – full closure for less than four weeks total duration;
- A5202 Royal College Street – full closure for less than four weeks total duration;
- A400 Camden Street -- two partial closures for a total of approximately 6 weeks and a two week full closure;
- A400 Kentish Town Road – two partial closures for four to eight weeks and two full closures of less than four weeks;

- Torbay Street/Leybourne Street, partial closures for around two months including a single night time closure;
- A502 Castlehaven Road – a single full closure for less than four weeks total duration;
- A502 Chalk Farm Road – a single full closure for less than four weeks total duration; and
- access road to Juniper Crescent – a single partial closure for around three months.

12.4.22 Traffic diversion lengths will vary according to the highway closure location and may be as much as 0.5km, or a little over one minute additional travel time as a result of the Chalk Farm Road closure. The effect of these diversions on traffic flows and delays to vehicle occupants is not significant.

12.4.23 The changes in traffic flows are expected to lead to congestion[122] and delays at junctions in the following locations:

- A4201 Parkway/Arlington Road – scenario 2 (minor adverse effect);
- Chalk Farm Road/Castlehaven Road – scenario 1 (minor adverse effect);
- A400 Kentish Town Road/Hawley Crescent – scenario 2 (minor adverse effect);
- Gloucester Avenue/Oval Road – scenario 2 (major adverse effect); and
- Pentonville Road/Claremont Square – scenario 1 (major adverse effect).

12.4.24 As a result of road closures and associated traffic diversions, construction of the Proposed Scheme will result in increases in daily traffic flow causing a significant increase in traffic-related severance[123] in the following locations:

- Albert Street – moderate adverse effect (all vehicles in scenario 1);
- Arlington Road – moderate adverse effect (all vehicles in scenarios 1, 2 and 3) and major effect (HGV in scenarios 2 and 3);
- Camden Gardens – moderate adverse effect (all vehicles and HGV in scenario 2);
- Castle Road east of Castlehaven Road – minor adverse effect (all vehicles in scenario 1) and HGV (moderate adverse effect in scenario 2);

[122] In assessing significant effects of traffic changes on congestion and delays, a major adverse effect occurs where traffic flows at a junction will be beyond or very close to capacity with the Proposed Scheme and the increases in traffic due to the Proposed Scheme will be such as to substantially increase queues and delays on a routine basis at peak times. A moderate adverse effect will occur when traffic flows at a junction will be approaching or at capacity with the Proposed Scheme and modest increases in traffic will increase the frequency of queues and more substantial delays. A minor adverse effect occurs when traffic flows at a junction are not generally exceeding capacity with the Proposed Scheme but the increase in flows will result in occasional queues and delays or small increases in existing delays.

[123] In the context of this Traffic and Transport section, 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.

- Castlehaven Road south of Castle Road – major adverse effect (all vehicles and HGV in scenario 2);
- Chalk Farm Road – moderate adverse effect (all vehicles and HGV in scenario 2);
- Farrier Street – major adverse effect (all vehicles in scenario 2);
- Greenland Road – major adverse effect (all vehicles and HGV in scenarios 1 and 2);
- A400 Kentish Town Road – moderate adverse effect (HGV in scenario 2);
- Oval Road – minor adverse effect (all vehicles in scenario 2);
- A4201 Parkway – moderate adverse effect (HGV in scenario 2);
- Rousden Street – minor adverse effect (all vehicles in scenario 2);
- Regent's Park Road – minor adverse effect (all vehicles in scenarios 1 and 2 and moderate adverse effect (HGV in scenario 2);
- Prince of Wales Road – moderate adverse effect (all vehicles and HGV in scenario 2);
- Royal College Street – moderate adverse effect (all vehicles in scenario 2); and
- St Pancras Way – moderate adverse effect (HGV in scenario 2).

12.4.25 Some of the effects listed above will extend across CFA boundaries, and where this is the case they are also identified and reported within those areas.

12.4.26 As a result of road closures and associated traffic diversions, construction of the Proposed Scheme is expected to result in decreases in daily traffic flow causing a reduction in traffic-related severance in the following locations:

- Camden High Street – moderate beneficial effect (all vehicles and HGV in scenario 2);
- A400 Kentish Town Road – major beneficial effect (all vehicles in scenario 2);
- Jamestown Road – moderate beneficial effect (all vehicles and HGV in scenario 2);
- Pratt Street – moderate beneficial effect (all vehicles and HGV in scenario 1); and
- Prince of Wales Road between Grafton Road and Talacre Road – major beneficial effect (all vehicles in scenario 2).

12.4.27 It is expected that the construction of the Proposed Scheme will require bus route diversions. A number of bus routes will need to be diverted. Bus routes 24, 27, 31, 168 and limited stop-commuter service 748 will be diverted by up to 1.5km for more than

four weeks as a result of the Chalk Farm Road closure. This could result in delays to services of up to three minutes and constitutes a major significant adverse effect.

12.4.28 At Randolph Street, Rousden Street and Chalk Farm Road car parking is likely to be suspended for periods in excess of four weeks. There will also be short-term removal of parking at other locations. All parking provision will be reinstated once the individual construction work at each location is completed.

12.4.29 The effects of parking suspensions will be:

- Randolph Street north and south – up to 19 permit-holder parking bays and approximately eight pay and display bays suspended for approximately six weeks (moderate adverse effect); and
- Castlehaven Road – a Barclays Cycle Hire docking station sufficient to hold 29 cycles and seven cycle stands during the Chalk Farm Road Bridge works. Alternative provision is located in Hawley Mews, but this is in excess of 250m away (major adverse effect).

12.4.30 The loss of parking at Rousden Street will be less than 10 spaces and at other locations only short-term and is not considered significant.

12.4.31 Access to properties will be maintained, including emergency access and detailed as part of construction site compound design.

12.4.32 As a result of potential diversion traffic increasing the flows on diversionary routes, routes, the following links are expected to potentially have an increased risk of accidents:

- Royal College Street – scenario 2 (minor adverse effect); and
- Chalk Farm Road – scenario 2 (moderate adverse effect).

12.4.33 A temporary impact on pedestrian links to public transport at Camden Road (Overground) Station is expected due to bus route diversions and bus stop changes. However, the duration of the main impact is expected to be less than four weeks and pedestrian access to the station will be maintained and the effect will not be significant.

12.4.34 Bus stop suspensions or relocations will be required but are mostly short term and not significant. Relocation of bus stop CQ during the Chalk Farm Road closure will be within a convenient distance from the existing facility and therefore will not be significant.

12.4.35 Construction activities and consequent temporary traffic and footpath diversions will result in extended travel distance for pedestrian and cycle routes. Local traffic management will be introduced to minimise local diversionary effects on non-motorised users while works are carried out but some of these will be significant.

12.4.36 At Camley Street and Randolph Street the severance effect is expected to be minor adverse. The severance effect associated with the Chalk Farm Road closure and 520m pedestrian diversion is expected to be major adverse. Diversions related to the closures at A5202 St Pancras Way/Baynes Street, A503 Camden Road, Camden Street and Kentish Town Road are not expected to be significant.

12.4.37 The need for rail possessions will be managed so that these take place for limited durations overnight and at weekends such that there will be no significant effects on rail travellers. Rail replacement services will be provided as necessary during rail possessions. Although there will be a six month closure of the Camden Road junction to Camden Junction link, this line is not used for passenger services and there are alternative routes available for freight services. The effects will not be significant.

12.4.38 Rail possessions are expected to be required as follows:

- approximately 160 mid-week night blockades; and
- a small number of weekend possessions.

12.4.39 No impacts are anticipated on users of the Regent's Canal.

Cumulative effects

12.4.40 The assessment includes the cumulative effects of planned development during construction by taking this into account within the background traffic growth.

12.4.41 The assessment also includes for in-combination effects by taking into account traffic and transport impacts of works being undertaken in neighbouring CFA areas. Specifically, the assessment includes the general diversion effects of road closures and construction traffic associated with the Euston Station and Approach area (CFA1).

12.4.42 The cumulative effects of simultaneous works in Euston Station and Approach area (CFA1) together with a full closure of Chalk Farm Road (in CFA2) and the B509 Adelaide Road (in CFA3) have been taken to represent a worst-case scenario for impacts in the Camden Town and HS1 Link area (CFA2).

Permanent effects

12.4.43 Any permanent effects of construction have been considered in the operations phase assessments for traffic and transport in Section 12.5. 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

12.4.44 The implementation of the draft CoCP (see Volume 5: Appendix CT-003-000/1) in combination with the framework travel plan and the construction workforce travel plan will, to some degree, mitigate the transport related effects during construction of the Proposed Scheme. The reductions in effects arising from the travel plan measures

have not been included in the assessment which will mean that the adverse effects may be over-stated.

12.4.45 Many signalised junctions in this area have adaptive control which will optimise the signals to accommodate changes in traffic and minimise delays due to changes in traffic flows. Consequently, many of those junctions with an identified minor adverse effect will be mitigated through adaptive control, which will mean that the adverse effects may be over-stated. This is, however, less effective where there is an overall increase in traffic.

12.4.46 Based on the outcomes of this assessment, no further traffic and transport mitigation measures during construction of the Proposed Scheme are considered necessary.

Summary of likely residual significant effects

12.4.47 Construction works will require a range of temporary and full road closures with associated diversions for buses, general traffic and cyclists. These will result in changes to traffic flows on the area and significant effects for all road users are expected. The main construction impacts and effects are expected during the period of peak construction traffic at Euston Station (in CFA1) together with a road closure at Chalk Farm Road Bridge and closures of the B509 Adelaide Road in CFA3 (scenario 2).

12.4.48 During this period, changes in traffic flows will from time to time lead to congestion, increasing delays for road users on A4201 Parkway/Arlington Road; Chalk Farm Road/Castlehaven Road; A400 Kentish Town Road/Hawley Crescent; Gloucester Avenue/Oval Road and Pentonville Road/Claremont Square.

12.4.49 Temporary traffic diversions will increase travel distance and time for all road users during the construction period and will include diversions to address temporary full road closures at: A5202 St Pancras Way/Baynes Street; Randolph Street; A503 Camden Road; A5202 Royal College Street; Torbay Street/Leybourne Street/Castlehaven Road; and Chalk Farm Road. The longest diversion will be around 0.5km and will be associated with the road closure at Chalk Farm Road Bridge. A single permissive path will be diverted at Camley Street.

12.4.50 The traffic changes resulting from diversions, the temporary closure of Chalk Farm Road Bridge and the works at Euston Station (CFA1) are expected to result in an increase in traffic flows in some locations (making it more difficult to cross the road from time to time) at Albert Street; Arlington Road; Camden Gardens; Castle Road (east of Castlehaven Road); Castlehaven Road (south of Castle Road); Chalk Farm Road; Farrier Street; Greenland Road; A400 Kentish Town Road; Oval Road; A4201 Parkway; Rousden Street; Regent's Park Road; Prince of Wales Road; Royal College Street; and A5202 St Pancras Way.

12.4.51 The traffic changes are also expected to result in decreases in traffic flow, making it easier to cross the road at Camden High Street; A400 Kentish Town Road; Jamestown

Road; Pratt Street; and Prince of Wales Road between Grafton Road and Talacre Road.

12.4.52 Bus route diversions will be required for routes 24, 27, 31, 168 and 748 during the Chalk Farm Road closure. Other bus route diversions in the area will be for shorter durations.

12.4.53 A temporary suspension of some car parking bays will be required at Randolph Street, Rousden Street and Chalk Farm Road for periods in excess of four weeks and some increases in accident risk are expected at Royal College Street and Chalk Farm Road.

12.4.54 The significant effects that result from construction of the Proposed Scheme are shown in Maps TR-03-002 to TR-03-003a-R1. (Volume 5, Traffic and Transport Map Book).

12.5 Effects arising from operation

Avoidance and mitigation measures

12.5.1 The following measures have been included as part of the design of the Proposed Scheme and will avoid or reduce impacts on transport users:

- there are no changes to the highway networks and roads that will be affected temporarily during construction will be reinstated to their pre-scheme condition; and
- pedestrian and cycle links will be reinstated, except where diversion is necessary.

12.5.2 The framework travel plan will set out how travel plans will be required to mitigate the impacts of traffic and transport movements associated with the maintenance and operation of the Proposed Scheme. The station travel plan for Euston station (in CFA1) will help reduce any traffic impacts in this area, by, in particularly promoting the use of sustainable modes by both workers and passengers.

12.5.3 For this area there are only limited traffic and transport related effects related to congestion and traffic-severance during operation of the Proposed Scheme. The route passes through the area on bridge and viaduct structures and there will be no stations or depots that generate any additional traffic, although the operation of Euston Station will result in some traffic impacts.

Assessment of impacts and effects

12.5.4 The following section considers the impacts on traffic and transport and the consequential effects resulting from the operational phase of the Proposed Scheme (as described in Section 2.4 of this report).

12.5.5 The operational traffic and transport related impacts during operation of the Proposed Scheme will be:

- changes in traffic flows due to operation of Euston Station in CFA1; and
- realignment of one PRoW.

12.5.6 At Camley Street, a short section of permissive path will be realigned to connect with the existing shared permissive path/cycle track from Camley Street to Agar Grove. The net diversion will be around 200m and the number of users is expected to be fewer than 200 per day. The permanent 200m change in journey length is a minor adverse effect.

12.5.7 The re-configuration of roads around Euston Station as part of the Proposed Scheme, including the permanent closure of Gordon Street and roads to the north of Euston Road and to the west of the station, along with increases in taxi flows, is forecast to result in a redistribution of traffic, with both increases in some locations and reductions in others.

12.5.8 In 2026, the Proposed Scheme, and specifically the operation of Euston Station, is expected to result in significant increases in peak hour traffic flows causing an increase in traffic-related severance for non-motorised users in the following locations:

- Caledonian Road – minor adverse effect; and
- A5200 York Way – minor adverse effect.

12.5.9 The Proposed Scheme is expected to result in decreases in peak hour traffic flows in 2026 causing a reduction in traffic-related severance in the following locations:

- Agar Grove – moderate beneficial effect (PM peak);
- Bayham Street – moderate beneficial effect (AM peak);
- Camden High Street – moderate beneficial effect (AM and PM peak);
- A400 Camden Street – minor beneficial effect (AM peak); and
- A5202 St Pancras Way – moderate beneficial effect (AM peak).

12.5.10 In 2041, during the morning and evening peak hours, increases in traffic as a result of the Proposed Scheme are expected to cause increases in congestion and delays, resulting in a moderate adverse effect at the A5200 York Way/Market Road junction.

12.5.11 Also in 2041, the Proposed Scheme is expected to result in increases in peak hour traffic flows causing an increase in traffic-related severance at the following locations:

- Caledonian Road – moderate adverse effect (PM peak);
- A5200 York Way – moderate adverse effect (PM peak);
- Albert Street north of Delancey Street – moderate adverse effect (AM peak);
- Arlington Road – moderate adverse effect (AM and PM peak);
- Camden Park Road – moderate adverse effect (PM peak);

- Oval Road – moderate adverse effect (AM Peak); and
- A4201 Parkway – moderate adverse effect (AM peak).

12.5.12 The Proposed Scheme is expected to result in decreases in peak hour traffic flows in 2041 causing a reduction in traffic-related severance at the following locations:

- Agar Grove – moderate beneficial effect (PM peak);
- Bayham Street – major beneficial effect (AM peak) and moderate beneficial effect (PM peak);
- Camden High Street – moderate beneficial effect (AM peak) and major beneficial effect (PM peak);
- A503 Camden Road – moderate beneficial effect (PM peak);
- A400 Camden Street – moderate beneficial effect (AM peak);
- Copenhagen Street – moderate beneficial effect (PM peak);
- Greenland Road – moderate beneficial effect (PM peak); and
- A5202 St Pancras Way – moderate beneficial effect (AM peak).

Cumulative effects

12.5.13 The assessment includes the cumulative effects of planned development during operation by taking this into account within the background traffic growth.

12.5.14 The assessment also includes for in-combination effects by taking into account transport impacts as a result of the Proposed Scheme in neighbouring CFA areas. For this area, this includes the Euston Station and Approach area (CFA1).

Other mitigation measures

12.5.15 The travel plan for Euston Station in CFA1 will, to some degree, mitigate the transport related effects during operation of the Proposed Scheme by promoting the use of sustainable modes by both workers and passengers. The reductions in effects arising from the travel plan measures have not been included in the assessment, which will mean that the adverse effects may be over-stated.

12.5.16 No further mitigation measures for the operation of the Proposed Scheme are considered necessary based on the outcomes of this assessment.

Summary of likely residual significant effects

Effects arising from operation

12.5.17 Only limited operational effects are expected, although there will be some effects as a result of the operation of Euston Station.

12.5.18 A permanent realignment of the Camley Street permissive path will be implemented, increasing journey distance for pedestrians and cyclists by around 200m.

12.5.19 Changes in traffic flows will increase delays for road users at the A5200 York Way/Market Road junction.

12.5.20 Increase in traffic flows of over 10% will affect pedestrians and cyclists willing to cross the road at Caledonian Road; A5200 York Way; Albert Street north of Delancey Street; Arlington Road; Camden Park Road; Oval Road; and A4201 Parkway.

12.5.21 However, decrease in traffic flows, resulting from a redistribution of traffic in the area, will improve conditions at Agar Grove; Bayham Street; Camden High Street; A503 Camden Road; A400 Camden Street; Copenhagen Street; Greenland Road and A5202 St Pancras Way.

12.5.22 The significant effects that result in this area from the Proposed Scheme in 2026 and 2041 are shown in Maps TR-04-002 to TR-04-003a (Volume 5, Traffic and Transport Map Book).

13 Water resources and flood risk assessment

13.1 Introduction

13.1.1 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 Proposed Scheme.

13.1.2 The section of the route in the Camden Town and HS1 Link area is predominantly on viaduct and does not cross any surface water features.

13.1.3 The main environmental features of relevance to water resources and flood risk include:

- the Grand Union Canal (the Regent's Canal);
- the Chalk Principal aquifer; and
- the Lambeth Group and Thanet Sand Formation Secondary A aquifers.

13.1.4 Key environmental issues relating to water resources and flood risk include:

- the potential impact on the water quality in the Regent's Canal;
- the potential impact on the risk of surface water flooding at the crossings of Camley Street, A400 Kentish Town Road and the Morrisons supermarket access road; and
- the potential impact on flood risk at the Camley Street main compound due to the highly unlikely failure of the Hampstead and Highgate Ponds.

13.1.5 Volume 5: Appendix WR-001-000 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 Directive[124] (WFD) compliance assessment; and
- a route-wide Flood Risk Assessment (FRA).

[124] *Directive 2000/60/EC (Water Framework Directive) 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.

13.1.6 Detailed reports on water resources and flood risk within this area are also contained in the Volume 5 appendices. These include:

- Appendix WR-002-002: Water Resources Assessment; and
- Appendix WR-003-002: Flood Risk Assessment.

13.1.7 Map Series WR-01 to WR-03 showing details referred to in this report and those in Volume 5 are all contained in the Volume 5, Water Resources and Flood Risk Assessment Map Book.

13.1.8 Where there is a residual impact to water resources and following mitigation there is a consequent effect on ecology, this is discussed further in Section 7 of this report.

13.1.9 Discussions have been held with the Environment Agency, TWUL and the Canal & River Trust (formerly British Waterways).

13.2 Scope, assumptions and limitations

13.2.1 The assessment scope, key assumptions and limitations for the water resources and flood risk assessment are set out in Volume 1 and in the SMR and the SMR Addendum, and appendices presented in Volume 5: Appendix CT-001-000/1 and Appendix CT-001-000/2. This report follows the standard assessment methodology.

13.2.2 The spatial scope of the assessment was based upon the identification of surface water and groundwater features within 1km of the centre line of the route, except where there is clearly no hydraulic connectivity. For surface water features in urban areas, the extent was reduced to 500m. Outside of these distances it is unlikely that direct impacts upon the water environment will be attributable to the Proposed Scheme. Where works extend more than 200m from the centre line, for example at stations and depots, professional judgement has been used in selecting the appropriate limit to the extension in spatial scope required. For the purposes of this assessment this spatial scope is defined as the study area.

13.2.3 The deepest excavation and foundation works for the Proposed Scheme in this area will be within the London Clay Formation. The London Clay Formation is classified as unproductive strata, and the works are therefore considered to be outside the spatial scope applicable for groundwater, including effects on abstractions in the deep aquifer (comprising the Chalk and Thanet Sand Formation).

13.2.4 Water Framework Directive (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 relevant River Basin Management Plan (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'.

13.2.5 No site visits have been carried out due to the nature of the Proposed Scheme and its limited potential for impacting water resources within the study area.

13.2.6 No specific hydraulic modelling has been undertaken within the study area. Existing hydraulic modelling made available from the Environment Agency or others has been used for the assessment of flood risk. The limitations associated with flood risk within this study area are described in detail in the flood risk assessment in Volume 5: Appendix WR-003-002.

13.3 Environmental baseline

Existing baseline – Surface water resources

Surface water features

13.3.1 Water bodies[125] within the Camden Town and HS1 Link area include the Grand Union Canal (the Regent's Canal) and an un-named pond south of Freight Lane north of the NLL Viaduct. This pond is either part of the highway drainage network or a drainage pond linked to the adjacent concrete batching plant. Aerial photos show it is dry at times, and it is not likely to be directly affected by the Proposed Scheme.

13.3.2 The route does not cross any surface watercourses in the area. The area is located within the Thames River Basin District (RBD) as set out in the River Basin Management Plan[126] (RBMP).

13.3.3 The Grand Union Canal (the Regent's Canal) is currently used for navigation by both commercial and leisure users.

13.3.4 Surface runoff currently drains into the Thames Water Utilities Ltd (TWUL) combined sewer network.

13.3.5 The current surface water baseline is shown on Map WR-01-002 (Volume 5, Water Resources and Flood Risk Assessment Map Book) and all surface water features within the study area are assessed within Volume 5: Appendix WR-002-002. Table 14 includes features potentially affected by the Proposed Scheme.

[125] The Environment Agency's Detailed Rivers Network (DRN) indicates a culverted watercourse (the River Fleet which is also known locally as the Middle Level No.2 Sewer) crossing the Grand Union Canal (the Regent's Canal, lower section) 30m west of Royal College Street. The watercourse 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.
[126] Environment Agency (2009), *River Basin Management Plan, Thames River Basin District*.

Table 14: Surface water features potentially affected by the Proposed Scheme

Water feature	Location description (see Volume 5, Water Resources and Flood Risk Assessment Map Book)	Water course classification[127]	WFD water body and current overall status	WFD status objective (by 2027 as in RBMP)	Receptor value[128]
Grand Union Canal (the Regent's Canal)	The canal is located within 225m of the route and is approximately 1.1km in length.	Artificial	Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm (GB70610078) Moderate and Regent's Canal, lower section (GB70610510) Moderate	Good Potential and Good Potential	High
Small pond, Freight Lane	The pond is located 45m north of the existing viaduct at Freight Lane, Camden Town. (CFA02-P01)	Not applicable	Not applicable	Not applicable	Low

Water Framework Directive status

13.3.6 West of the Hampstead Road Lock, the Grand Union Canal (the Regent's Canal) forms part of the Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm water body. East of the lock, the Grand Union Canal (the Regent's Canal) forms part of the Regent's Canal, lower section water body. The Environment Agency predicts that both of these water bodies will have Good Potential by 2027.They are currently assessed by the Environment Agency as being at Moderate status.

Abstraction and permitted discharges

13.3.7 Two surface water abstractions from the Grand Union Canal (the Regent's Canal) are present within the study area. These are both included on the same abstraction license and are located 160m and 500m south of the route.

13.3.8 No current surface water discharge consents have been identified within the study area.

[127] 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.

[128] For examples of receptor value see Table 43 in the addendum to the SMR (Volume 5, Appendix CT-001-000/2).

Existing baseline – groundwater resources

Geology and hydrogeology

13.3.9 The geological formations within this study area are described in Section 8, and further details are included in Volume 5: Appendix WR-002-002.

13.3.10 The location of abstractions, geological formations and indicative groundwater levels are shown on Map WR-02-002 (Volume 5, Water Resources and Flood Risk Assessment Map Book).

13.3.11 A summary of the superficial and bedrock geology and hydrogeology is presented in Table 15. Unless otherwise stated, the geological groups listed are all crossed by the route.

Table 15: Summary of geology and hydrogeology

Geology	Distribution	Formation description	Aquifer classification	WFD water body and current overall status	WFD status objective (by 2027 as in RBMP)	Receptor value
Superficial deposits						
No superficial deposits are present in this area						
Bedrock						
Thames Group (London Clay Formation and. Harwich Formation)	Across entire study area (penetrated by the Proposed Scheme)	Sandy, silty, clay	Unproductive Strata	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Lambeth Group (Reading and Woolwich Formations)	Assumed to underlie London Clay Formation throughout the area (not penetrated by route)	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/Moderate
Thanet Sand Formation	Assumed to underlie the Lambeth Group throughout the study area (not penetrated by route)	Green, brown silty sand	Secondary A	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Cretaceous Chalk Group (White Chalk subgroup)	Underlies the Thanet Sand Formation throughout the area (not penetrated by Proposed	Firm white chalk with marl seams and flint bands	Principal	Mid-Chilterns Chalk GB40601G601200 Poor	Good	High

Geology	Distribution	Formation description	Aquifer classification	WFD water body and current overall status	WFD status objective (by 2027 as in RBMP)	Receptor value
	Scheme).					

Superficial deposits

13.3.12 There are no superficial deposits within the Camden Town and HS1 Link area.

Bedrock aquifers

13.3.13 The London Clay Formation underlies the whole of the study area. The London Clay Formation comprises unproductive strata.

13.3.14 The geological succession beneath the London Clay Formation comprises, in turn the:

- Harwich Formation, a thin sandy deposit which may be present in some areas;
- Lambeth Group (also termed the Woolwich and Reading Formations) which comprises mixed sands and clays and pebble deposits in some locations;
- Thanet Sand Formation, a dense silty, fine grained sand; and
- Cretaceous Chalk Group, which is a succession of soft white limestones.

13.3.15 The Proposed Scheme will not have any direct impact on the Harwich Formation, the Lambeth Group, the Thanet Sand Formation or the White Chalk subgroup.

Water Framework Directive status

13.3.16 No WFD classification has been given by the Environment Agency to the superficial deposits.

13.3.17 The London Clay Formation is classified by the Environment Agency as unproductive strata.

13.3.18 The Lambeth Group and Thanet Sand Formation are not assessed by the Environment Agency; however they may be in hydraulic continuity with the underlying Chalk aquifer which is classified as being part of the Mid-Chilterns Chalk groundwater body.

Abstractions and permitted discharges

13.3.19 According to Environment Agency and LBC records, there are three licensed groundwater abstractions, and no unlicensed abstractions in the study area. There is the potential for further unlicensed abstractions to exist, as a licence is not required for abstraction volumes below 20 cubic metres per day. Details are presented in Volume 5: Appendix WR-002-002. The abstractions are classified as high value receptors.

13.3.20 Of the three licensed groundwater abstractions in the study area, one of these licenses has two abstractions at the same property. Only one licensed abstraction is used for public water supply (PWS) and its associated groundwater Source Protection Zone (SPZ) is within 1km of the route. There are no further SPZ in this study area associated with PWS abstractions in adjacent study area.

13.3.21 There are no consented discharges to ground/groundwater within 1km of the Proposed Scheme in the study area.

Surface water/groundwater interaction

13.3.22 No surface water/groundwater interactions have been identified in the area.

Water dependent habitats

13.3.23 There are no areas with statutory ecological designations in relation to surface water or groundwater in the study area.

Existing baseline – flood risk

River flooding

13.3.24 The agreed data set for river flooding is the Environment Agency Flood Zone Mapping.

13.3.25 The route will not cross over any Environment Agency designated main rivers or ordinary watercourses within this study area according to the Detailed River Network, as shown on Map WR-01-002 (Volume 5, Water Resources and Flood Risk Assessment Map Book). The entire study area is within Flood Zone 1.

Surface water flooding

13.3.26 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 Assessment[129] (PFRA) and the LBC Surface Water Management Plan[130]. The Environment Agency Flood Map for Surface Water (FMfSW) has also been reviewed to inform the assessment of surface water flood risk, and is shown on Map WR-01-002 (Volume 5, Water Resources and Flood Risk Assessment Map Book).

13.3.27 The North London Strategic Flood Risk Assessment[131] (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. Flooding of A400 Kentish Town Road and A502 Hawley Road is shown to have occurred during the 1975

[129] London Borough of Camden (2011), *Preliminary Flood Risk Assessment for London Borough of Camden*.
[130] Halcrow (2013), *Surface Water Management Plan*, London Borough of Camden.
[131] Mouchel (2008), *North London Strategic Flood Risk Assessment*.

flood event within the study area[132]. The LBC PFRA states that surface water flooding also occurred in the borough during the July 2007 flooding event.

13.3.28 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 200 annual probability (0.5%) event. The most substantial areas of predicted surface water flooding are along Camley Street and at the Chalk Farm Road (Railway) Bridge, where flooding of over 1.5m is predicted at both locations. More detailed information on the risk of surface water flooding can be found in Volume 5: Appendix WR-003-002.

Sewer flooding

13.3.29 The agreed datasets for sewer flooding are TWUL records in the LBC PFRA and the North London SFRA.

13.3.30 Records of historical sewer flooding events held by TWUL show that there have been a number of sewer flooding incidents in the study area. The LBC PFRA states that sewer flooding occurred within LBC in August 2004, September 2005 and July 2007. Specific locations of these flood incidents are not given.

Artificial water bodies

13.3.31 The agreed dataset for flooding from reservoirs is the Environment Agency Reservoir Inundation Map, as shown on Map WR-01-002 (Volume 5, Water Resources and Flood Risk Assessment Map Book).

13.3.32 Flooding from artificial systems may occur from failure of a retaining structure which impounds water.

13.3.33 The Proposed Scheme will cross an area at risk of flooding on the Environment Agency Reservoir Inundation Map in the event of a failure of the Hampstead and Highgate Ponds. The predicted flooding follows the alignment of the mainline railway between Kentish Town and St Pancras Station, but also extends into Camley Street. Part of the Camley Street main compound lies within the area of risk.

13.3.34 The route will pass within 15m of the Grand Union Canal (the Regent's Canal). The canal is at or below ground level and does not pose a residual risk of failure in this area, and is therefore not considered further.

Groundwater flooding

13.3.35 The agreed dataset for groundwater flooding is the LBC PFRA.

13.3.36 There are no historical incidents of groundwater flooding within the study area, and geological mapping indicates that there are no superficial deposits present. The LBC PFRA does not report a potential for elevated groundwater within the study area.

[132] London Borough of Camden (2003), *Floods in Camden: Report of the Floods Scrutiny Panel*.

Future baseline

13.3.37 Volume 5: Appendix CT-004-000 identifies developments with planning permission or sites allocated in adopted development plans, on or close to the Proposed Scheme. These are termed 'committed developments' and will form part of the baseline for the operation of the Proposed Scheme. The potential cumulative effects arising from committed developments in relation to water resources and flood risk have been considered as part of this assessment of the construction and operation of the Proposed Scheme.

13.3.38 There are no committed developments that are likely to cause significant changes to the water resources and flood risk baseline prior to construction of the Proposed Scheme in this study area. All developments are required to comply with the National Planning Policy Framework, development plans and other legislation and guidance. As such committed developments should have a neutral effect on the water resources and flood risk baseline.

13.3.39 WFD future status objectives are set out in Tables 14 and 15. This potential change in baseline is not considered to result in the effects from the Proposed Scheme changing in significance.

Climate change

13.3.40 Current projections to the 2080s indicate that climate change may affect the future baseline against which the impacts of the Proposed 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 in the following paragraphs, these changes are not considered to result in the reported effects from the Proposed Scheme changing in significance.

13.3.41 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.

13.3.42 When considering the influence that climate change may have on the future baseline, against which impacts from the Proposed Scheme on flood risk have been evaluated, the assessment has used the recommended precautionary sensitivity ranges of key parameters, as given in Table 5 in the Technical Guidance to the NPPF. The sensitivity testing undertaken allows for variations in climate change factors included in other national guidance.

13.3.43 Further information on the potential additional impacts of climate change for water resources and flood risk is provided in Section 7 and 8 of Volume 1 and Table 13 Volume 5 Appendix CT-009-000.

13.4 Effects arising during construction

Avoidance and mitigation measures

13.4.1 The general approach to mitigation is set out in Volume 1, Section 9.15.

13.4.2 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: Appendix WR-002-002 and WR-003-002.

13.4.3 The route through the area is largely on an existing viaduct and does not cross any surface water bodies and therefore avoids permanent impacts to surface water features.

13.4.4 Drainage, including track drainage and drainage from associated access roads and hardstandings, will discharge, under agreement, to TWUL sewer and so avoid permanent impacts on surface water features in this area.

13.4.5 The deepest excavation and foundation works proposed will be within the London Clay Formation. The works will take place within this unproductive strata and therefore there will be no significant effects on groundwater.

13.4.6 There will be no additional permanent piers within the spans at any of the bridge or viaduct crossings, thereby minimising the potential permanent impacts on surface water flooding overland flow paths within the study area.

13.4.7 The main construction compounds at Camley Street and the HS1-HS2 Link tunnel portal will not obstruct any surface water flooding overland flow routes. There will be no impact in the unlikely event of a failure of the Hampstead and Highgate Ponds and the risk of such a failure will be not be impacted by the scheme since neither of these ponds are close to the route. As stated in Section 16 of the draft CoCP, such areas will have site specific flood risk management plans prepared prior to construction.

13.4.8 The draft CoCP sets out the measures and standards of work that will be applied to the construction of the Proposed Scheme (see Volume 5: Appendix CT-003-000). These will provide effective management and control of the impacts during the construction period.

13.4.9 The following examples illustrate how implementation of the measures within the draft CoCP will reduce potentially significant adverse effects on water resources and flood risk to levels that will not be significant.

13.4.10 Measures defined in the draft CoCP, such as detailed method statements, to control and manage the rate and volume of runoff, will reduce the risk of flooding. These measures will also reduce the risk of accidental discharge where utility or other construction work is being carried out next to Hawley Lock on the Grand Union Canal (the Regent's Canal, lower section) and will ensure that there will be no effect on

surface water quality or flows associated with construction (see draft CoCP, Section 16).

13.4.11 In accordance with the draft CoCP Section 16, monitoring will be undertaken in consultation with the Environment Agency, prior to, during and post-construction, if required, to establish baseline conditions for surface water such as the Grand Union Canal (the Regent's Canal, lower section) and other unclassified water features and to confirm the effectiveness of agreed temporary and permanent mitigation measures.

13.4.12 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 the Camley Street and HS1-HS2 Link portal main compounds, preventing an increase in the risk of sewer flooding.

13.4.13 The main construction compound at Camley Street will be located within an area at risk of surface water and impounded reservoir flooding (from the Hampstead and Highgate Ponds). As stated in Section 16 of the draft CoCP, such areas will have site specific flood risk management plans prepared prior to construction.

Assessment of impacts and effects

13.4.14 This section describes the significant effects following the implementation of avoidance and mitigation measures.

13.4.15 Further details of the potential impacts that will not have significant effects are provided in the Water Resources Assessment report in Volume 5: Appendix WR-002-002 and Flood Risk Assessment in Appendix WR-003-002.

13.4.16 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-001-000).

13.4.17 It is not considered that projected climate change effects, combined with the effects from the construction of the Proposed Scheme, will alter the significance of any of the reported effects on surface water and groundwater resources (see Volume 3 for further information).

Temporary effects

Surface water

13.4.18 The assessment shows that there will be no significant temporary effects on surface water features, surface water abstractions or discharges during the construction period.

Groundwater

13.4.19 The assessment shows that there will be no significant effects on groundwater, abstractions/discharges or surface water/groundwater interactions in this study area during the construction period.

Flood risk

13.4.20 The assessment has identified no significant increase in risks resulting from all sources of flooding during the construction process and therefore no significant temporary effects.

Cumulative effects

13.4.21 There are no committed developments that have been identified which will result in significant cumulative temporary effects.

Permanent effects

Surface water

13.4.22 No significant adverse permanent effects to surface water resources have been identified during the assessment.

Groundwater

13.4.23 The assessment demonstrated that there will be no significant, permanent effects on the groundwater, abstractions/discharges or surface water/groundwater in this study area.

Flood risk

13.4.24 For all sources of flooding, the impact will be negligible and therefore the likely residual effect is not significant.

Cumulative effects

13.4.25 There are no committed developments that have been identified which will result in significant cumulative permanent effects.

Other mitigation measures

13.4.26 No other mitigation measures are envisaged for surface water, groundwater or flood risk.

Summary of likely significant residual effects

13.4.27 Following mitigation no significant residual effects to surface water, groundwater or flood risk have been identified within the assessment.

13.5 Effects arising from operation

Avoidance and mitigation measures

13.5.1 Generic examples of design measures that will mitigate impacts so that there will be no significant adverse effects on the quality and flow characteristics of surface water courses and groundwater bodies during operation and management of the Proposed Scheme are described in Volume 1.

13.5.2 The railway drainage system will be designed to collect, transport and dispose of surface water in a safe and controlled manner that is acceptable to the appropriate

regulatory body or statutory water undertaker. Therefore, the impacts to surface water receptors will be negligible during operation under the future baseline.

13.5.3 Generic examples of management measures during operation and management of the Proposed 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-001-000.

Operation and management of the Proposed 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.

Assessment of impacts and effects

13.5.4 There are considered to be no significant adverse effects to groundwater or flood risk arising from operation of the Proposed Scheme.

Other mitigation measures

13.5.5 There are considered to be no further measures required to mitigate adverse effects on surface water resources or groundwater resources or flood risk.

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