HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement and Additional Provision 2 Environmental Statement

Volume 4 | Off-route effects

July 2015

SES and AP2 ES 3.4.1

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Department for Transport

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Contents

List of figures

List of tables

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

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

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

- glossary of terms and list of abbreviations. This contains any new or different terms and abbreviations used throughout the SES and the AP2 ES compared to those included in the main ES and the AP1 ES.

1 Introduction

1.1.1 The hybrid Bill for High Speed Rail between London and the West Midlands ('the Bill') was submitted to Parliament together with an Environmental Statement (ES) in November 2013 ('the main ES'). If enacted by Parliament, the Bill will provide the powers to construct, operate and maintain Phase One of High Speed Two (HS2). This phase of HS2 will provide a new north-south railway between London, Birmingham and the West Midlands. Phase Two of HS2 will comprise new lines between the West Midlands, Leeds and Manchester, completing what is known as the 'Y network'. Phase Two is not the subject of this document.

1.1.2 Since the deposit of the Bill for Phase One of HS2, a number of amendments to the scheme were identified as a result of further discussions with landowners and occupiers (including through the Parliamentary petitioning process), design refinements, and the requirements of utility undertakers. These amendments were assessed and any new or different likely significant environmental effects were reported in the Additional Provision Environmental Statement ('the AP1 ES'), published in September 2014. The AP1 ES was deposited in Parliament at the same time as the Bill amendments.

1.1.3 None of the amendments in AP1 related to off-route areas and therefore off-route effects were scoped out of that assessment. There was no Volume 4 included within the AP1 ES.

1.1.4 Since deposit of AP1 in September 2014, the need for further design changes and amendments has arisen following on-going discussions with petitioners, key stakeholders, and as a result of design refinements. New environmental information has also become available. Any new or different significant environmental effects that are likely to result from these proposed changes, new environmental information and amendments are reported in the Supplementary Environmental Statement (SES) and the Additional Provision 2 Environmental Statement ('the AP2 ES'). The SES reports on further environmental information, changes to the scheme assumptions and changes relating the existing Bill powers and limits, whereas the AP2 ES reports on the likely significant environmental effects of the latest additional provisions to the Bill. The SES and the AP2 ES are therefore separate environmental statements, but have been produced as combined volumes.

1.1.5 Both the SES and the AP2 ES provide an update to the main ES and AP1 ES, they should be read in conjunction with them.

1.1.6 None of the SES design changes are likely to generate new or different significant off-route environmental effects, and therefore are scoped out of this assessment.

1.2 Terminology used to describe the scheme

1.2.1 In order to differentiate between the original proposals assessed as part of the main ES and subsequent changes, the following terms are used throughout the SES and the AP2 ES:

- 'the original scheme' - the Bill scheme submitted to Parliament in November 2013, which was assessed in the main ES;

- 'the AP1 revised scheme' - the original scheme as amended by the AP1 (i.e. the amendments assessed within the AP1 ES) submitted in September 2014;
- 'the SES scheme' - the original scheme with the design changes described in the SES that are within the existing powers of the Bill; and
- 'the AP2 revised scheme' - the original scheme as amended by the SES design changes and AP2 amendments.

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

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

1.3 Purpose of this report

1.3.1 This report presents those aspects of the construction and operation of the AP2 revised scheme that have the potential to generate likely significant environmental effects in locations remote to the route corridor (i.e. 'off-route'). The nature of the scheme means that such effects are principally, but not exclusively, related to implications for other transport infrastructure.

1.3.2 The CFA reports 4-26 (Volume 2) and the route-wide effects report (Volume 3) present the likely significant effects generated 'on-route'; that is to say within the route corridor and the local environment from London Euston station to Birmingham Curzon Street station and Handsacre.

1.3.3 Off-route effects are defined as those that may occur at locations beyond the scheme's route corridor and its associated local environment, and which are not covered within the spatial scope of the CFA reports or route-wide effects report.

1.3.4 The purpose of this report is to describe any new or different likely significant off-route effects as a result of the AP2 amendments in comparison with the effects of the original scheme and AP1 revised scheme.

1.3.5 This report outlines the amendments to the original scheme concerning the proposed Heathrow Express (HEx) depot at Langley in Slough and a number of modifications to the West Coast Main Line (WCML) between Lichfield and Colwich. These sections provide a description of each amendment and an assessment for each environmental topic where a potential change to the likely significant effects reported in the main ES has been identified. A description is provided of the residual effects predicted to occur as a result of the proposed amendments in the area, following the application of mitigation measures.

1.3.6 Figure 1 identifies the HEx depot, Langley referred to in this report.

1.3.7 The standard measures that will be used to mitigate likely significant adverse environmental effects during HS2's construction and operation are described in the main ES, Volume 1, Section 9 and the draft Code of Construction Practice (CoCP)

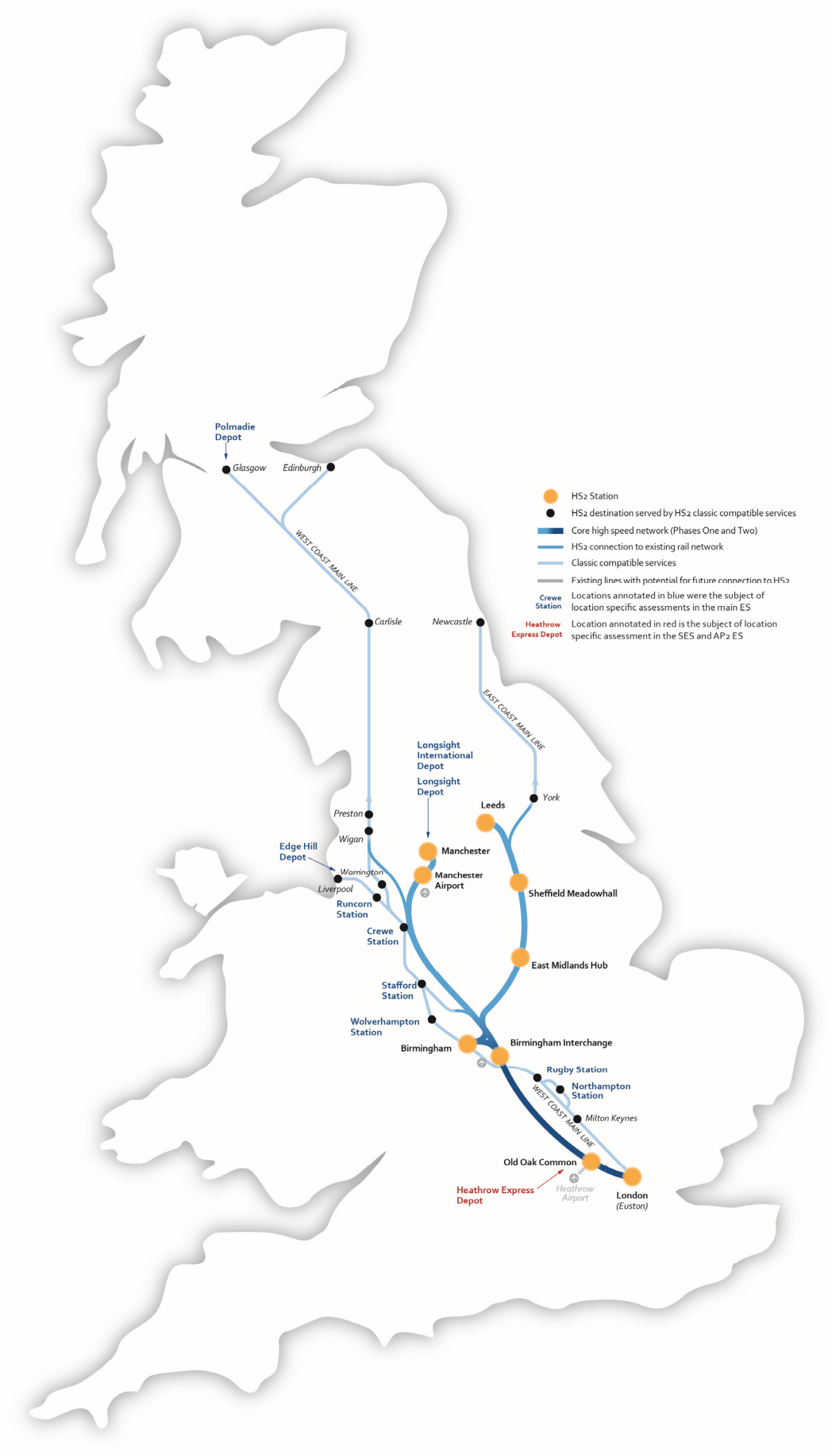
submitted in support of the Bill. Implementation of these measures has been assumed in this SES and AP2 ES.

1.4 Structure of this report

1.4.1 The report is structured as follows:

- Section 1: Introduction;
- Section 2: Proposed Heathrow Express Depot, Langley; and
- Section 3: Modifications to the WCML between Lichfield and Colwich.

Figure 1: Locations of off-route stations and depots included in the main ES and SES and AP2 ES



2 Proposed Heathrow Express depot, Langley (AP2-000-001)

2.1 Reason for the revision to the scheme

2.1.1 Construction of the HS2 station at Old Oak Common requires the permanent relocation of the existing HEx depot at Old Oak Common. The Bill provides for this to be relocated to the east end of the North Pole Depot (refer to main ES map CT-18 in the main ES Volume 4: off-route Effects Map Book). The east end of the North Pole Depot is the former rail depot for Eurostar trains within London and is located to the east of Scrubs Lane.

2.1.2 Since submission of the Bill it has been determined that the relocation of the HEx depot to the eastern side of the North Pole Depot would affect the operation of the Intercity Express Programme (IEP) Depot, located on the western side of the North Pole site, and compromise the ability to maintain and operate the Great Western Main Line (GWML). Additionally, relocating the HEx depot to the North Pole (east) site would preclude planned redevelopment in the area, which is identified for residential housing and commercial development in the adopted Royal Borough of Kensington and Chelsea Core Strategy (2010)[1] and is within the Kensal Canalside Opportunity Area identified by the Greater London Authority. The west of the site is identified for rail operations by London Borough of Hammersmith and Fulham in the adopted Core Strategy (2011)[2]. Consequently, alternative sites for the relocation of the HEx depot were identified and appraised and the proposed HEx depot, Langley (referred to within this report as the 'proposed HEx depot'), was selected as an alternative (refer to map CT-05-HEx in SES and AP2 ES Volume 4: Off-route Effects Map Book). The provision of the relocated HEx depot at the eastern end of the North Pole depot has therefore been removed from the SES scheme (SES-004-002) and is assessed in SES and AP2 ES, Volume 2, CFA4, Kilburn (Brent) to Old Oak Common.

2.2 Overview of the area

Settlement, land use and topography

2.2.1 The proposed HEx depot sidings, maintenance, office and storage buildings and the western section of the HEx depot east connection trackwork are located within the Slough Borough Council unitary authority area. The eastern section of the HEx depot east connection trackwork is located within the administrative areas of Buckinghamshire County Council and South Bucks District Council (which share the same authority boundary throughout the area) and the civil parishes of Iver and Wexham.

2.2.2 The proposed HEx depot is bounded by the Slough arm of the Grand Union Canal to the north, the GWML railway to the south, Langley Station, Canal Wharf Industrial Estate and the B470 Station Road to the west and Thorney Lane Business Park and Iver Station to the east. The GWML proposed east connection trackwork will cross

[1] Kensington and Chelsea Borough Council (2010), *Core Strategy for the Royal Borough of Kensington and Chelsea*.
[2] Hammersmith and Fulham Council (2011); *Hammersmith and Fulham Council Core Strategy: Local Development Strategy*.

Hollow Hill Lane, which passes from north to south through the site. Horton Brook flows across the site in a north-west to south-east direction.

2.2.3 A former oil depot is located at the western end of the proposed depot site and is currently in use for works including the electrification of the GWML as part of the Crossrail project. To the east of the former oil depot there is an open area containing grassland and deciduous woodland. Agricultural land is located to the west and east of Hollow Hill Lane. The majority of the proposed HEx depot site, as far as the eastern side of the maintenance shed, falls within a section of the Colne Valley Regional Park and green belt land that encompasses land to the east and west of Hollow Hill Lane. The HEx depot approach trackwork will cross the historic Hollow Hill Lane and Iver landfills, which are located to the east of Hollow Hill Lane.

2.2.4 The topography across the wider area is gently undulating. The area around the proposed HEx depot site is predominantly urban fringe, with the villages of Langley and Richings Park immediately to the south of the existing GWML railway and the proposed HEx depot site. The land to the north of the railway is less developed, including farmland and Iver Golf Course. The village of Iver is located approximately 800m to the north of the proposed depot site. Properties are also located at the Mansion Lane and Dudley Wharf caravan sites, approximately 100m to the north of the proposed HEx depot east connection trackwork, and on Hollow Hill Lane, to the north of the Grand Union Canal, approximately 200m from the proposed HEx depot east connection trackwork.

2.2.5 Map CT-10-HEx in SES and AP2 ES Volume 4: Off-route Effects Map Book shows the key environmental features within and surrounding the proposed HEx depot near Langley.

2.2.6 Figure 2 shows the wider area within which the proposed depot is situated.

Key transport infrastructure

2.2.7 The M25 runs in a north to south direction approximately 3.5km to the east of the proposed site and the M4 runs in an east-west direction approximately 2.5km to the south of Langley.

2.2.8 The GWML runs in an east to west direction between London Paddington station and Reading, the south-west and outh Wales, and serves Langley and Iver stations within the area.

2.2.9 The Slough Arm of the Grand Union Canal also runs east to -west approximately 50m to the north of the proposed site.

2.2.10 Public Rights of Way (PRoW) through the wider area include the towpath of the Slough Arm of the Grand Union Canal (Footpath IVE/17 in the parish of Iver and WEX/18 in the parish of Wexham) and the footpath which runs south to north through the centre of the agricultural land to the east of Market Lane (the continuation of Hollow Hill Lane south of the GWML), between North Park (road) and the southern side of the GWML (Footpath IVE/15).

Socio-economic profile

2.2.11 Data for South Buckinghamshire and Slough Unitary Authority was used to provide a socio-economic context for the area. The total population of South Buckinghamshire district is 66,900. Of the total population, 71% are economically active, which is around 48,000 people. The unemployment rate in the district in the 2011 census stood at 4%, which was lower than the average of 7% for England. The total population of Slough Unitary Authority is 140,200 with around 100,400 (71.6%) economically active. The unemployment rate in the Slough Unitary Authority in the 2011 census was 5%, which is slightly lower than the national average.

Notable community facilities

2.2.12 The main shops and services in the vicinity of the proposed HEx depot are located in the large village of Langley. These include Harrow Market located on Station Road and the Langley Pavilion Community Centre which provides a venue for local clubs and groups. There are a number of education facilities in Langley, including Langley Grammar School, the Langley Academy and East Berkshire College.

2.2.13 The small village of Richings Park is located immediately south of Iver station, to the west of Langley and east of the M25. A small number of local amenities are located on Wellesley Avenue, including a post office, and there is a small parade of shops on Bathurst Walk.

2.2.14 The village of Iver is located to the north-east of the proposed HEx depot site. Shops and services are located on the High Street and Iver village infant and junior schools serve the local residential area.

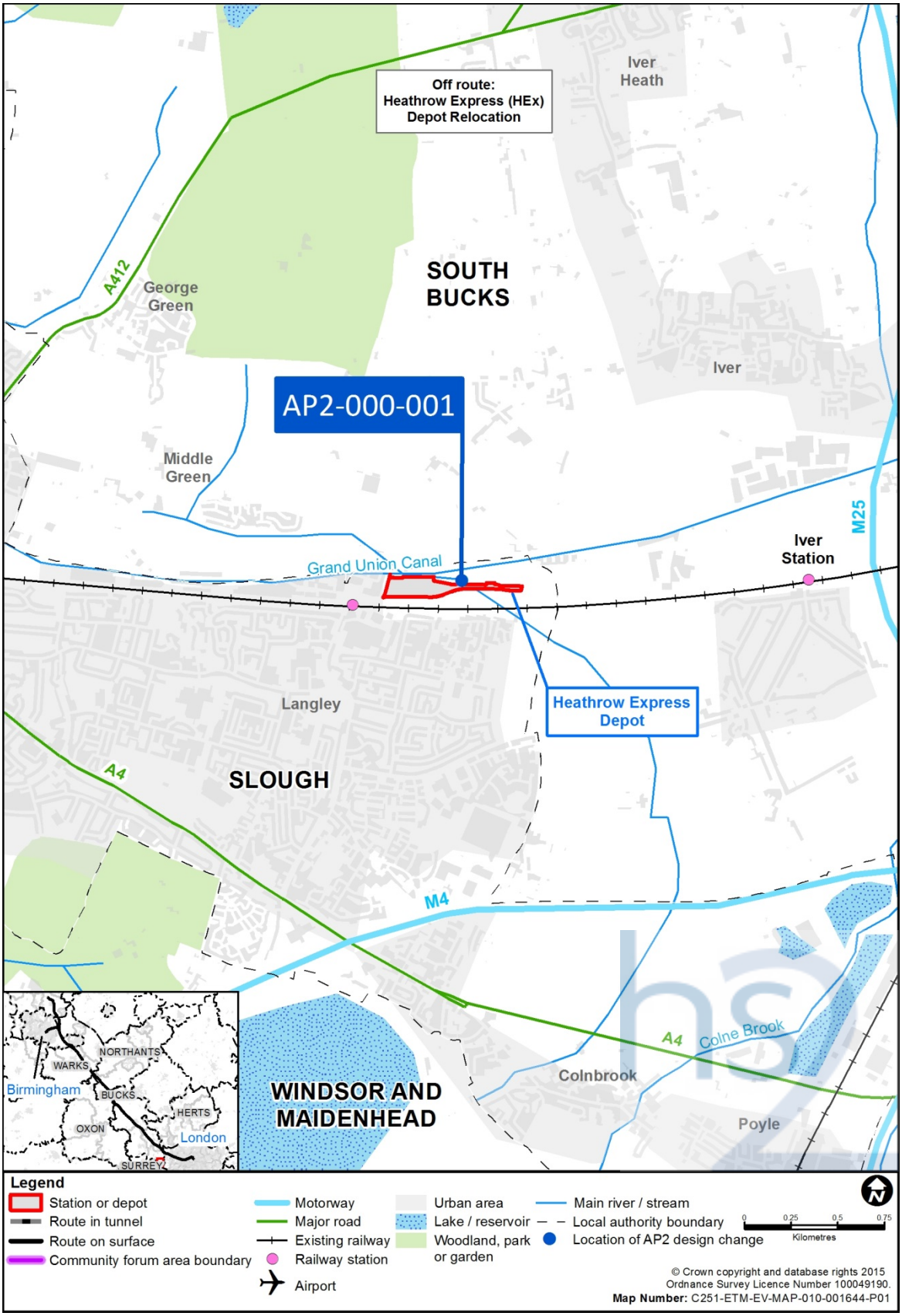
Recreation, leisure and open space

2.2.15 The Slough Arm of the Grand Union Canal provides an informal recreational space for pedestrians who use its towpath and for users of canal boats, some of which have residential moorings on the stretch of the canal to the north of the study area.

2.2.16 The proposed HEx depot site is partially located within the south-west edge of the Colne Valley Regional Park, which covers an area of approximately 110km². The park is focused around the Colne Valley lakes, Grand Union Canal and River Colne, which are used for a range of leisure activities including sailing, fishing, water skiing, walking and bird watching.

2.2.17 Within Langley, the Langley Leisure Centre provides facilities for recreational and leisure passtimes and Maplin Park provides the main open space and recreational facilities, which include a children's play area and football fields. Richings Sports Park, a private sports facility, is located within the village of Richings Park, to the west of Wellesley Avenue. Richings Park Golf Course and Country Club also provide sports and leisure facilities. To the north of the canal, Iver Recreation Ground, located to the south of the High Street, incorporates a wide range of facilities including children's play equipment, sports pitches and a BMX track. Iver Golf Club and Academy, located to the north of the Grand Union Canal, to the west of Hollow Hill Lane, provides a nine-hole golf course.

Figure 2: Area context map



Policy and planning context

Planning framework

2.2.18 Volume 1, Section 2.8 of the main ES sets out the policy and legislative framework under which the AP2 revised scheme is being taken forward. Given that HS2 will be developed on a national basis to meet a national need it is not included or referred to in many local plans. Nevertheless the proposed HEx depot has been considered in the local context and relevant local plan documents and policies have been considered in relation to environmental topics.

2.2.19 The 2km area for which planning data has been collected also includes the London Borough of Hillingdon. Relevant planning documents include:

- South Bucks Local Development Framework Adopted Core Strategy Development Plan Document and Proposals Map (2011) [3];
- South Bucks Adopted Local Plan (1999) Saved Policies (2007 as updated 2011)[4];
- Slough Local Development Framework Adopted Core Strategy (2008)[5];
- Slough Adopted Site Allocations Development Plan Document and Proposals Map (2010)[6];
- Slough Adopted Local Plan (2004) Saved Policies (as updated 2010)[7];
- The Buckinghamshire Adopted Minerals and Waste Local Plan (2006) Saved Policies[8];
- Buckinghamshire Adopted Minerals and Waste Core Strategy (2012)[9]; and
- Adopted Berkshire Replacement Minerals Local Plan (2001) Saved Policies (2007)[10];
- Adopted Waste Local Plan for Berkshire (1998) Saved Policies (2007)[11];
- Adopted London Borough of Hillingdon Local Plan: Part 1 – Strategic Policies (2012) (previously known as Core Strategy)[12];
- Adopted London Borough of Hillingdon, Unitary Development Plan (UDP) Saved policies (2007)[13];
- London Borough of Brent, Ealing, Harrow, Hillingdon, Hounslow and

[3] South Bucks District Council (2011) South Bucks Local Development Framework Adopted Core Strategy Development Plan Document and Proposals Map
[4] South Bucks District Council (1999) South Bucks District Local Plan, Adopted March 1999, Consolidated September 2007 and February 2011
[5] Slough Borough Council (2008) Slough Local Development Framework Adopted Core Strategy
[6] Slough Borough Council Slough (2010)Adopted Site Allocations Development Plan Document and Proposals Map
[7] Slough Borough Council (2004) Slough Adopted Local Plan (2004) Consolidated 2010
[8] Buckinghamshire County Council (2006) The Buckinghamshire Adopted Minerals and Waste Local Plan Saved Policies
[9] Buckinghamshire County Council (2012) Minerals and Waste Core Strategy Development Plan Document
[10] Berkshire County Council (2001) Adopted Berkshire Replacement Minerals Local Plan
[11] Berkshire County Council (1998) Adopted Waste Local Plan for Berkshire Consolidated 2007
[12] London Borough of Hillingdon (2012) Local Plan: Part 1 – Strategic Policies
[13] London Borough of Hillingdon (1998) Adopted Unitary Development Plan, Saved Policies

Richmond upon Thames, West London Waste Plan, Submission Draft (2014)[14];

- Adopted The London Plan: Spatial Development Strategy for Greater London (2015). Further Alterations to the London Plan (FALP)[15]; and
- The Mayor of London's Transport Strategy (MTS) (2010)[16].

2.2.20 There are a number of key planning policies which cover the proposed HEx depot. The South Bucks Proposals Map (2011) shows that the majority of the eastern part of the proposed HEx depot, consisting of the east connection tracks, is designated as green belt (South Bucks Local Plan Saved Policies GB1 and GB4). It is also within the Colne Valley Park (Core Strategy Policy CP9). The Court Lane Opportunity Site (Core Strategy Policy 16 - Employment Allocation) is located within 250m of the proposed HEx depot across the M25 on the southern side of the Grand Union Canal.

2.2.21 The part of the proposed HEx depot site that falls within South Bucks District is designated as a mineral safeguarding area (Bucks Minerals and Waste Core Strategy Policy CS1) and a small section of the eastern part of the proposed HEx depot, approximately 200m to the east of Hollow Hill Lane and south of the Mansion Lane Caravan Park, is safeguarded for a rail waste transfer station ('Richings Park') in Bucks Minerals and Waste Core Strategy Policy CS14.

2.2.22 The Slough Core Strategy Proposals Map shows that the western side of the proposed HEx depot is within the Colne Valley Regional Park (Core Strategy Policy CP2 and Local Plan Saved Policy CG1) and Strategic Gap area (Core Strategy Policies CP1, CP2) and partially within green belt (Core Strategy Policies CP1, CP2). An area within the HEx depot site adjacent to the Horton Brook is identified as liable to flooding (Core Strategy Policy CP8). The site also includes a Site Specific Allocation SSA24 for a non-statutory informal nature reserve on land west of Hollow Hill Lane. Part of the HEx depot site, the former oil depot and railway station car park, is designated as a key location for regeneration (SKL 4) with the area allocated for mixed use predominantly residential use, within the Slough Adopted Site Allocations Development Plan Document and Proposals Map (2010). It is however noted that this development would be unviable due to the land required for the proposed HEx depot. Core Strategy Policy CP5 (Employment) and Local Plan Saved Policies EMP10 and EMP12 for existing business areas also partially cover the western area of the proposed HEx depot.

2.2.23 Emerging policies are not generally considered, unless a document has been submitted to the Secretary of State for approval as with the West London Waste Plan. This was submitted for examination in July 2014 and is expected to be adopted in July 2015 subject to individual borough agreement. It should also be noted that London Borough of Hillingdon is consulting on various components of Part 2 of the Hillingdon Local Plan, which will consist of the development management policies, site specific allocations and an associated proposals map. South Bucks District Council has also noted an intention to produce a new local plan for South Bucks District with

[14] London Borough of Brent, Ealing, Harrow, Hillingdon, Hounslow and Richmond upon Thames, (2014) West London Waste Plan, Submission Draft

[15] Greater London Authority (2015) The London Plan: Spatial Development Strategy for Greater London Consolidated With Alterations Since 2011, Further Alterations to the London Plan (FALP).

[16] Greater London Authority (2010) Mayor's Transport Strategy (MTS)

consultation due to start in April 2015; however, the consultation documentation has yet to be published and as such is not considered within this assessment.

Committed and proposed development

2.2.24 Development proposals with planning permission or sites allocated in adopted development plans, on or close to the proposed HEx depot, are shown on map CT-13-HEx in the SES and AP2ES, Volume 5: Committed Developments Map Book and listed in SES and AP2ES, Volume 5: Committed Developments Appendix SES AP2 HEX-CT-001. Except where noted otherwise, in Volume 5: Appendix SES AP2 HEX-CT-001, it has been assumed, in accordance with Volume 1 of the main ES, that these developments will have been completed by 2017. These, together with the major proposals referred to in paragraph 2.2.24, are termed 'committed developments' and have been taken into account for the purpose of assessing the likely significant environmental effects of the proposed HEx depot. Where these developments have a particular relevance to an assessment topic, this is noted in the future baseline section for that topic.

2.2.25 There are two major committed infrastructure proposals (Langley/18 and Langley/5) in the vicinity of the proposed HEx depot shown on map CT-13-HEx in the SES and AP2ES, Volume 5: Committed Developments Map Book, namely:

- the M4 smart motorway (to be constructed between 2017 and 2021); and
- Spelthorne District Council application SP/13/00141/SCC for extraction of sand and gravel from land at Homers Farm with new access and associated buildings (development granted in 2015 and to be complete by 2020).

2.2.26 Such developments have potential to result in cumulative effects taken with the proposed HEx depot, between 2017-2019 during construction of the proposed HEx depot and post-2019 during operation. They are referred to in those topic sections where such a cumulative effect has been identified.

2.2.27 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 HEx depot, are termed 'proposed developments'. These are listed in in SES and AP2ES, Volume 5: Committed Developments Appendix SES AP2 HEX-CT-001. They are not included in the assessment.

2.3 Description of the AP2 revised scheme

2.3.1 The following section describes the main features of the proposed HEx depot near Langley, including the main environmental mitigation measures. Further generic information on typical permanent features is provided in Volume 1, Section 5 of the main ES. Similarly, a general description of the approach to mitigation is set out in Volume 1, Section 9 of the main ES.

2.3.2 The proposed HEx depot will require some land on a permanent basis, the key features of which are illustrated on maps CT-06-154 to CT-06-155 in the SES and AP2 ES, Volume 4: Off-route Effects Map Book. Land will also be required on a temporary basis for construction, the key features of which are illustrated on maps CT-05-154 to CT-05-155 in the SES and AP2 ES, Volume 4: Off-route Effects Map Book.

2.3.3 Approximately 40ha of land is required temporarily during construction of the proposed HEx depot of which 18.8 ha is required permanently. The land needed to meet this requirement is not within the existing limits of the Bill, hence the need for this amendment.

2.3.4 Key features of the proposed HEx depot near Langley will include:

- a maintenance shed comprising three maintenance/stabling sidings, office, staff welfare facilities and storage;
- eight maintenance/stabling sidings with controlled emission toilets (CET) facilities;
- a carriage delivery siding (to be used for unloading train carriages from lorries onto the railway);
- two turnback sidings (located to the north and south of the depot lines);
- plant room and train wash unit;
- an electrical substation;
- new trackwork connecting the depot to the GWML;
- access road within the depot boundary;
- a car park;
- restored agricultural land located to the east of Hollow Hill Lane;
- alterations to overhead line equipment on the GWML and depot operation signalling;
- realignment and lowering of a section of Hollow Hill Lane;
- a floodplain storage area;
- wetland habitat creation within the floodplain storage area;
- landscape planting;
- replacement woodland habitat creation; and
- two access roads to restored agricultural land.

2.3.5 A section of Hollow Hill Lane will be realigned by up to approximately 25m to the west of its existing alignment and lowered by approximately 4m. A new road underbridge will be constructed across the realigned Hollow Hill Lane upon which the new HEx depot trackwork will be constructed. The underbridge will be constrained in height by the need to connect the new depot to the existing GWML at its current level. Hollow Hill Lane will require lowering to ensure adequate overhead clearance for road vehicles and realignment to meet current road safety standards, although the height restriction at the existing GWML rail overbridge will not be altered.

2.3.6 The maintenance shed, office and storage buildings, associated sidings, CET facilities, car parking and electrical substation will all be located at the western end of the proposed HEx depot site, adjacent to the eastern side of the Canal Wharf Industrial

Estate. The land on which these structures will be built will be raised to approximately 3m higher than existing ground levels.

2.3.7 The existing ground levels across the proposed HEx depot site are generally lower than the adjacent GWML embankment to which the new depot trackwork will need to connect. It will therefore be necessary to raise the ground levels across the site to provide the required connections to the GWML and to construct the depot on a level site.

2.3.8 The maintenance shed with associated facilities will be approximately 12m high by 150m long, by 40m wide. The eight maintenance/stabling sidings, carriage delivery siding and turnback sidings will all be approximately 250m each in length and will accommodate trains up to 235m long (nine car) in four and five car combinations. CET facilities will be located at the maintenance/stabling sidings. The turn back siding will allow trains to manoeuvre within the depot.

2.3.9 The electrical substation at the far western end of the proposed HEx depot site will convert high voltage electricity to low voltage electricity that will be suitable to provide power to the equipment within the depot including depot lighting, cranes, signalling systems and the plant room and train wash unit.

2.3.10 The train-wash will be located to the east of the depot sidings, approximately 150m to the west of the realigned Hollow Hill Lane along the HEx depot west connection trackwork. These facilities and the depot connection trackwork will be built on an embankment up to approximately 3m high.

2.3.11 To the east of the realigned Hollow Hill Lane, the HEx depot east connection trackwork will be built on embankment up to approximately 2m high for approximately 130m and then in shallow cutting up to approximately 2m deep for approximately 600m. Approximately 1.8km of the HEx depot east connection trackwork will be constructed through the historic Iver and Hollow Hill Lane landfills located between Hollow Hill Lane to the west and the Thorney Lane Industrial Estate to the east. The east connection will be constructed using a reinforced concrete slab supported on bored piles. Where this route crosses the historic landfill, the landfill material will be excavated to the base of the slab and replaced with inert material. Piling will not extend below the base of the London Clay. The landfill material and piling arisings will be removed for disposal off site.

2.3.12 The floodplain storage area will be approximately 6ha and will be constructed adjacent to the western side of Hollow Hill Lane, the southern side of the Grand Union Canal and the northern side of the depot trackwork. This area will be excavated by up to approximately 2.5m below existing ground level at the north-eastern area, with the remaining area regraded by up to approximately 0.5m.

2.3.13 A section of Horton Brook and another small adjacent unnamed watercourse will be placed in realigned channels across the area to be used for flood storage and into culverts where these waterways cross under the HEx depot trackwork and existing GWML.

2.3.14 Wetland habitat will be created within the floodplain storage area to replace existing habitat removed across the proposed depot site, including along the Horton Brook and unnamed watercourse, during construction.

2.3.15 Landscape planting will be provided along the northern edge of the floodplain storage area, to the south of the Grand Union Canal towpath and in sections along the northern side of the depot trackwork to provide visual screening and replace existing vegetation removed during construction.

2.3.16 Woodland habitat will be created to the north of the depot maintenance, offices and storage building, and to the west of Hollow Hill Lane between the depot trackwork and the GWML to compensate for the loss of woodland vegetation across the proposed depot site.

2.3.17 The two access roads to restored agricultural land located to the east of Hollow Hill Lane will be provided to the north of the GWML and to the south of the Mansion Lane Caravan Park.

2.4 Alternatives

2.4.1 Since submission of the Bill it has been determined that the relocation of the HEx depot to the eastern side of the North Pole Depot would affect the operation of the Intercity Express Programme (IEP) Depot, located on the western side of the North Pole site, and compromise the ability to maintain and operate the GWML. Additionally, relocating the HEx depot to the North Pole (east) site would preclude planned redevelopment in the area. Therefore, alternative sites and local alternatives have been identified and appraised by Network Rail, the Department for Transport and HS2. As the HEx depot would form part of the classic network Network Rail has considered alternative depot locations and appraised them using its Governance for Railway Investment Projects (GRIP) process. GRIP requires that engineering requirements, cost and potential environmental impacts are considered during the options selection process. The alternatives originally considered for the relocation of the HEx depot are described within Section 6.6, main ES Volume 4: Off-route effects.

2.4.2 The main alternative sites and associated local alternatives (sub-options) for the relocation of the HEx Depot that have been identified and appraised since submission of the Bill are:

- West Ealing: a triangular site north of the GWML, comprising an existing track maintenance facility, bounded to the east by Hanwell Station, to the west by West Ealing Station and to the north by Drayton Green Station;
- Southall east: two sub-options using different areas within a site to the east of Southall Station, south of the GWML:
  - sub-option 1: land parallel to the GWML, comprising the existing railway maintenance and restoration facilities, bounded to the east by an industrial park; and
  - sub-option 2: land parallel to the Brentford Branch railway line, which runs south east of the GWML. This site consists of a warehouse building and open scrub land;
- Crossrail depot: relocated HEx depot to be colocated within the Crossrail Depot site currently being built at Old Oak Common, to the north of the current First Great Western and HEx Depots, and the existing GWML;
- former brewery site, Park Royal: three sub-options using different areas, in

addition to existing railway land, located within a large site located to the north of Park Royal station, as follows:

- east sub-option: land currently containing four disused sidings connected to Old Oak Common West Junction by the Wycombe single line, located to the west of Rainsford Road;
- central sub-option: land immediately to the west of the east sub-option, north of Coronation Road; and
- west sub-option: land to the west of the central sub-option recreation area to the west of Lakeside Drive and Western Avenue;

- East Greenford: a site including parts of Perivale Wood, an ancient woodland, the Royal Mail distribution centre and Greenford Business Park (where a ventilation shaft for the HS2 Northolt Tunnel will be provided);
- Langley: three sub-options on land bounded to the south by the Great Western Mainline, to the north by the Grand Union Canal, to the west by Station Approach and to the east by Thorney Lane;
  - east sub-option: land to the east of Hollow Hill Lane within green belt together with adjacent land designated as a waste and aggregates site;
  - central sub-option: land wholly within the green belt and floodplain; and
  - west sub-option: land to the west of Hollow Hill Lane, currently in industrial use, to the east of the Canal Wharf Industrial Estate, together with adjacent land to the east of Hollow Hill Lane, designated as a waste and aggregates site, would be required, in addition to green belt land and floodplain;
- Southall north-west: a site comprising Southall Gas Works and the surrounding airport parking facility to the north of the GWML, to the south of the Grand Union Canal and to the west of Southall Station; and
- Reading depot: existing depot site located to the north of the GWML, west of Reading Station, including a strip of agricultural land.

2.4.3 Following a series of options appraisal workshops, the west sub-option on the site to the north-east of Langley was identified as the preferred option to take forward as part of the AP2 revised scheme. This was because all the other sites either:

- did not work in operational terms;
- were not of sufficient size;
- required significant additional works to the network;
- had significant planning constraints;
- had potential to disrupt other rail services; and/or
- would be comparatively more costly to construct.

2.4.4 In comparison, the west sub-option on the site to the north-east of Langley was preferred for operational reasons and could be constructed more quickly than the

other sites considered. Although the GRIP appraisal process identified the proposed HEx depot site near Langley would be partially constructed within green belt land and within the floodplain of the Horton Brook, the risks associated with construction within the floodplain could be mitigated through the design.

2.4.5 Further, in relation to the configuration of the Langley site, an option selection workshop was held to agree the final preferred vertical alignment of the proposed HEx depot. The options considered were:

- option VA1: ground height across the site would be raised by up to approximately 7m higher than existing ground levels and no works to the existing rail bridge over Hollow Hill Lane ('Chequers Bridge') would be required;
- option VA2: ground height across the wider site would be up to approximately 4m higher than existing and a slight easterly realignment and lowering of Hollow Hill Lane, including provision of a new road underbridge, would be required; and
- option VA3: ground height across the wider area would be up to approximately 2m higher than existing and a substantial diversion of Hollow Hill Lane to the east would be required. Hollow Hill Lane would be longer and run through the former Hollow Hill Lane and Iver landfills and agricultural land and may require some demolitions at Thorney Lane Business Park.

2.4.6 Option VA1 was largely discounted due to the potential for greater landscape, visual and noise impacts, when compared to the other two options, which would result from constructing the depot at higher level. Option VA3 was largely discounted due to the additional works and likely additional landscape and visual impacts associated with the construction of the Hollow Hill Lane diversion. Option VA2 was deemed to be the preferred of the three vertical options considered because there would not be a need to substantially divert Hollow Hill Lane as for Option VA3, and whilst there was still a likelihood of landscape, visual and noise effects, these would not be as great as for Option VA1.

2.5 Construction of the AP2 revised scheme

2.5.1 A guide to standard construction techniques is provided in Volume 1, Section 6.7 to Section 6.26 of the main ES. General provisions that will guide the construction process and the approach to environmental management are set out in Volume 1, Section 6.4 of the main ES and the draft CoCP (see Volume 5: Appendix CT-003-000 of the main ES).

2.5.2 Construction works at the proposed HEx depot site will comprise the following general stages:

- advanced works including site investigations further to those already undertaken, preliminary mitigation works and preliminary enabling works;
- civil engineering works including establishment of construction compounds, site preparation and enabling works, main earthworks and structure works, site restoration, including implementation of mitigation measures such as landscaping, and removal of construction compounds;

- railway installation works including establishment of construction compounds, infrastructure installation such as laying ballast or slabs and tracks and/or installing power supply and communications features, connections to utilities, changes to the existing rail network and removal of construction compounds; and
- system testing and commissioning.

Construction compounds

2.5.3 The construction of the proposed HEx depot near Langley will be managed from compounds. The compounds will act as the main interface between the construction work sites and the public highway, as well as performing other functions specific to the structures being built and the works undertaken. Compounds will either be main compounds, or satellite compounds which are generally smaller. Some compounds will be used for civil engineering works and others for railway installation works and in some cases for both.

2.5.4 At the proposed HEx depot site civil engineering works will be managed from one main compound and three satellite compounds. Railway installation works will be managed from one main compound and one satellite compound. These construction compounds are shown on map CT-05-154 and CT-05-155 in the SES and AP2 ES Volume 4: Off-route Effects Map Book. Figure 3 shows the management relationship for civil engineering works compounds and Figure 4 for the railway installation works compounds.

2.5.5 Information on the function of the proposed compounds, including general provisions for their operation including security fencing, lighting, utilities supply, site drainage and codes of worker behaviour are set out in Volume 1, Section 6 of the main ES and the draft CoCP (Section 5).

2.5.6 None of the construction compounds will provide overnight worker accommodation. Work at all construction compounds will be undertaken within core working hours as described in the main ES Volume 1, Section 6.3 except during rail possession works where works will be undertaken over 24 hour working days.

Station Approach satellite compound

2.5.7 The Station Approach satellite compound will be used for civil engineering works to upgrade Station Approach for construction vehicles and to connect temporary site facilities to utilities. These temporary site utilities connections will become the permanent connections for the depot at a later date. The compound will be located to the south of the Grand Union Canal and the Canal Wharf Industrial Estate, and to the north of Langley station. The compound will:

- be in place for approximately nine months, commencing in the second quarter of 2017;
- support between approximately 30 and 40 workers each day depending on the stage of the civil engineering works;
- be managed from the Hollow Hill Lane main compound, as illustrated in Figure 3.

2.5.8 No diversions of utilities or new permanent utility supplies are anticipated for the compound. However, telecommunication/media cables run to the north and south of the site; the location of these will be investigated further prior to the commencement of construction works and possible protection measures implemented as part of the scheme.

2.5.9 Works at this construction compound will be carried out in the following broad phases:

- utilities installation along Station Approach, maintaining access to the station at all times;
- installation of new permanent boundary fencing; and
- site clearance, including removal of topsoil where ground investigation is required.

Heathrow Express depot main compound

2.5.10 The HEx depot main compound will be used as a main compound for rail systems works. This will include railway installation works to construct the maintenance/stabling and turn back sidings within the depot maintenance building. It will house the offices used for the overall management of the proposed depot rail systems works. The HEx depot main compound will manage the rail systems works undertaken at the HEx east connection satellite compound.

2.5.11 Part of the compound will also be used as a satellite compound for civil engineering works to construct the maintenance shed, including the depot offices and storage buildings. This is because civil engineering and rail systems works will overlap within the depot building area.

2.5.12 A temporary logistics material stockpile for the depot earthworks will be located within this compound during construction and will be used for management of material import and export.

2.5.13 The HEx depot main compound will be located to the south of the Grand Union Canal, to the east of the Canal Wharf Industrial Estate, and will:

- be in place for approximately three years, commencing in the second quarter of 2017, with civil engineering works being undertaken for the duration of this period concurrently with rail systems works which will be undertaken for approximately two years and six months;
- support between approximately five and 30 workers each day during rail systems works, including overhead line equipment and signalling construction workers, depending on the stage of the works, and between approximately 30 and 50 workers each day during civil engineering works, depending on the stage of the works;
- provide main compound support to one rail systems satellite compound, as illustrated in Figure 4; and
- be managed from the Hollow Hill Lane main compound for civil engineering works, as illustrated in Figure 3.

2.5.14 Construction of the maintenance shed and the associated sidings will require the removal of a steel framed warehouse building and associated structures in addition to a large area of hardstanding associated with the former oil depot.

2.5.15 Diversion of electricity cables and potentially some telecommunication / media cables utilities and the installation of new utilities associated with the depot will be required, the key ones are likely to be:

- diversion of two 11 KV electrical cables to the west of the proposed HEx Depot site related to a substation on Station Road and a substation located within the former oil depot;
- diversion or abandonment of 11KV electrical cables to the east of the site;
- diversion of telecommunication/media cables located both to the east and south of the site, if not already abandoned as part of unrelated previous works in the area;
- diversion of telecommunication/media cables located in the middle of the site, if not already abandoned as part of unrelated previous works in the area;
- a new 11KV distribution network operator (DNO) supply which will provide power to high voltage and low voltage substations for lighting, heating, operation of the wash plant and other activities;
- new surface water and foul drainage;
- provision of new gas supplies to be supplied from Station Road;
- provision of new water supplies from Station Road; and
- provision of new communication supplies to the proposed depot.

2.5.16 Civil engineering works carried out from this compound will be carried out in the following broad phases:

- site clearance and existing structure demolition;
- divert existing utilities;
- import fill material;
- construction of small retaining structures;
- construction of depot pile foundations;
- substructure construction;
- depot superstructure structural steelwork;
- cladding;
- internal fit out; and
- landscaping including paving and roads.

2.5.17 Rail systems works carried out from this compound will be carried out concurrently with the civil engineering works. Initially, rail systems works will focus on the existing GWML infrastructure. Once the civil engineering works in the depot have sufficiently advanced, the depot rail systems works will begin. Rail systems works from this compound will be carried out in the following phases:

- restoration of the existing sidings located to the north of the GWML;
- modifying the existing GWML track, signalling and overhead line equipment to enable connection of the new depot to the existing rail network;
- installation of new depot traction power feed from the existing Network Rail supplies on the GWML;
- installation of the depot trackwork, overhead line equipment and rail systems installation outside of the maintenance building;
- installation of railway systems to the wash plant track and provision for the wheel lathe;
- construction of the new maintenance/stabling sidings and the CET sidings within the maintenance building;
- connection of the HEx depot west connection trackwork to the existing railway Infrastructure; and
- overall testing and commissioning of railway systems elements.

Hollow Hill Lane main compound

2.5.18 The Hollow Hill Lane main construction compound will provide the central project management office and logistics handling for civil engineering works for the duration of the works at the proposed HEx depot. It will coordinate and manage the earthworks to the east and west of Hollow Hill Lane, including excavation of the floodplain storage area, construction of the embankment and cutting upon which the HEx depot east connection trackwork will be installed and land levelling and raising in the area where the depot maintenance shed and sidings will be constructed. The construction of the temporary eastern access road and works to culvert Horton Brook and another watercourse through the site will also be coordinated from this compound.

2.5.19 All civil engineering works satellite construction compounds at the proposed HEx depot will be managed from the Hollow Hill main compound.

2.5.20 The Hollow Hill Lane main construction compound will be located adjacent to the southern side of the Grand Union Canal, to the east of the Canal Wharf Industrial Estate. It will:

- be in place for approximately three years, commencing in the second quarter of 2017;
- support between approximately 25 and 50 workers each day depending on the stage of the civil engineering works; and
- provide main compound support to three civil engineering satellite compounds, as illustrated in Figure 3.

2.5.21 Construction of the temporary eastern access road and the cutting, within which the HEx depot east connection trackwork will be installed, will require the demolition of a concrete batching plant located adjacent to the northern side of the GWML within Thorney Lane Business Park.

2.5.22 Works in this section of the proposed HEx depot will be carried out in the following broad phases:

- advance works, including surveys and appropriate mitigation measures;
- site clearance and enabling works;
- installation of main office compound;
- provision of site haul roads;
- provision of a materials handling areas for embankment works;
- provision of heavy goods vehicle (HGV) wheel wash plants;
- utilities diversions/protection works and construction of new culverts;
- excavation of floodplain storage area;
- construction of flood bunding to floodplain storage area;
- installation of piling mat for crossing of the historic Iver and Hollow Hill landfills east of Hollow Hill Lane;
- installation of landfill piles;
- excavation and construction of reinforced concrete slab; and
- excavation of cutting and creation of embankment to underside of rail ballast.

Hollow Hill Lane underbridge satellite compound

2.5.23 The Hollow Hill Lane underbridge satellite compound will be used for civil engineering works to construct the realigned section of Hollow Hill Lane and associated underbridge and for protection works to existing oil and gas pipes/mains adjacent to Hollow Hill Lane. The compound will:

- be in place for approximately one year and six months commencing in the second quarter of 2017; and
- support between approximately five and 20 workers each day depending on the stage of the civil engineering works; and
- be managed from the Hollow Hill Lane main compound.

2.5.24 No diversions or permanent utility supplies are anticipated within the compound. Protection measures to existing gas and oil pipelines will be implemented and existing easements associated with these pipes will be respected during the construction activities.

2.5.25 Works in this section of the proposed HEx depot site will be carried out in the following broad phases:

- installation of traffic management measures to protect workforce while keeping Hollow Hill Lane open;
- exposure and inspection of existing mains oil and gas pipeline;
- construction of utilities protection slab;
- installation of piles for new Hollow Hill Lane HEx depot rail bridge that will carry the new depot trackwork;
- construct foundations;
- construct wing walls and retaining walls;
- excavate new road alignment;
- install new road drainage, diverted utilities, kerbing and paving;
- move traffic onto new alignment;
- remove section of existing Hollow Hill Lane; and
- complete connection of new Hollow Hill Lane rail bridge into depot embankment and maintenance access roads.

Heathrow Express depot east connection satellite compound

2.5.26 This compound will be used for the installation of trackwork to the existing GWML to allow the HEx depot west connection and HEx depot east connection trackwork to cross over the existing trackwork. The compound will also be used to tie in the new HEx depot east connection trackwork to the existing GWML trackwork at the eastern end of the site, close to Iver Station.

2.5.27 This compound will be located to the north of the GWML and Richings Park, and to the east of the Thorney Lane Industrial Estate. It will be established in advance of the HEx depot main rail systems construction works commencing on site in order to carry out enabling works to the overhead line equipment. The compound will:

- be in place for approximately two years and nine months commencing in the first quarter of 2017; and
- support between approximately five to 50 workers each day depending on the stage of the civil engineering works, including overhead line equipment and signalling workers; and
- be managed from the HEx depot main compound.

2.5.28 Works from this compound will be carried out in the following phases:

- relocation of existing overhead line equipment;
- installation of trackwork crossovers to the existing GWML;
- installation of a new road rail access point which will allow maintenance of the depot;
- removal of the existing 'up Iver goods loop', a section of track on the GWML

that allows slower freight trains to be overtaken by faster passenger trains to allow construction of the new depot lines;

- testing and commissioning of railway systems crossovers; and
- testing and commissioning of the railway systems before and after the new depot becomes operational.

Construction traffic routes

2.5.29 The movement of construction vehicles carrying materials, plant, other equipment and workforce (or moving empty) will take place both within the construction sites and on public roads. The construction compounds will provide the interface between the construction works and the public highway.

2.5.30 Movements between the construction compounds and the worksites will be on designated haul roads within the proposed HEx depot site, often within the area of the works or running parallel to them.

2.5.31 Construction works at the proposed HEx depot site will be accessible via three possible construction traffic routes:

- western access route: to/from the north of the site Junction 1 (Denham Roundabout) of the M40/A40, A412, Wood Lane, Langley Park Road, Station Road and into the western section of the site via Station Approach;
- eastern access route via Thorney Lane (North): to/from the north of the site via Junction 1 (Denham Roundabout) of the M40/A40, A412 Denham Road, Bangors Road (North and South), High Street, Thorney Lane (North), Thorney Lane Business Park and into the eastern side of the site via a temporary eastern access road; and
- eastern access via Thorney Lane (south): to/from the south of the site via Junction 5 (Langley Roundabout) of the M4, London Road, Sutton lane, North Park, Richings Way, Thorney Lane (South), Thorney Lane Business Park and into the eastern side of the site via a temporary eastern access road.

2.5.32 All construction compounds within the proposed HEx depot site will be accessible via any of these construction traffic routes, although the Station Approach satellite compound will usually be accessed from the western access route and all other construction compounds will usually be accessed via the eastern access routes.

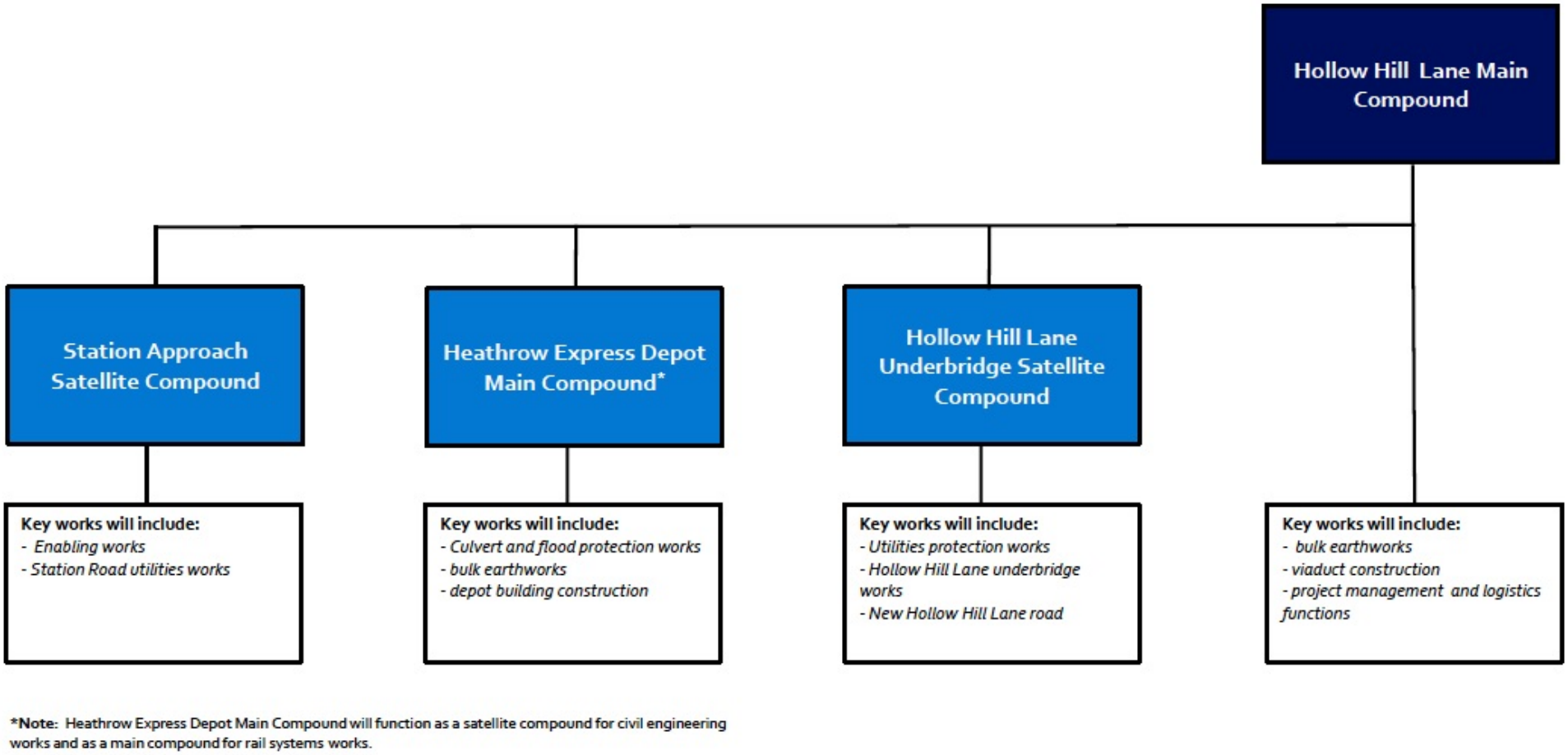
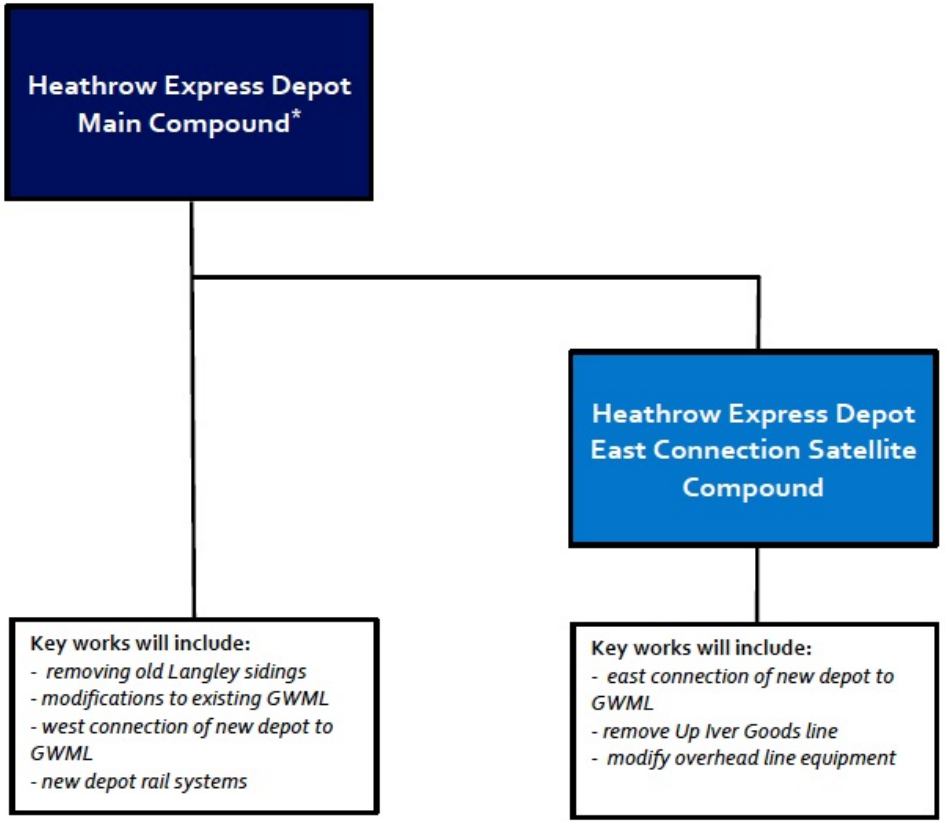


Figure 3: Schematic of construction compounds for civil engineering works



*Note: Heathrow Express Depot Main Compound will function as a satellite compound for civil engineering works and as a main compound for rail systems works.

Figure 4: Schematic of construction compounds for railway installation works

2.6 Construction waste and material resources

2.6.1 Forecasts of the amount of construction, demolition and excavation waste (CDEW) that will be generated during the construction of the proposed HEx depot have been prepared and are presented in full in the SES and AP2 ES Volume 5: Waste and Material Resources Appendix WM-001-000 Annex 1. There will not be any worker accommodation sites for the proposed HEx depot construction and therefore no waste will be generated from this source.

2.6.2 The proposed HEx depot was previously occupied by an oil depot, and remediation of the site has already taken place.

2.6.3 The proposed HEx depot is situated over two historic landfill sites, namely Iver and Hollow Hill landfill sites. Excavation of these sites will generate both non-hazardous and hazardous waste, which will require off-site disposal.

2.6.4 Most of the proposed HEx depot will be cleared prior to works commencing, including the removal of areas of hardstanding. A concrete batching plant within the Thorney Lane Industrial Estate at the eastern end of the proposed HEx depot will be demolished to allow construction of the proposed HEx depot east connection trackwork.

2.6.5 The majority of excavated material generated across the AP2 revised scheme will be reused as engineering fill material or in environmental mitigation earthworks, either with or without treatment as appropriate. This material is, therefore, not included within the waste quantities below.

2.6.6 Based on the mitigation earthworks design approach adopted for the AP2 revised scheme, local shortfall of excavated material within the proposed HEx depot will be managed with the aim of contributing to the overall balancing of excavated material on a route-wide basis.

2.6.7 The forecast quantities of CDEW from the proposed HEx depot that will require off-site disposal to landfill are shown in Table 1.

Table 1: Estimated construction, demolition and excavation waste quantities

Waste type	Estimated quantity of waste generated (tonnes)	Estimated quantity of waste for off-site disposal to landfill (tonnes)
Excavation	187,278	187,278
Demolition	2,188	219
Construction	11,924	1,192
Worker accommodation	n/a	n/a
TOTAL	201,390	188,689

2.6.8 The estimated quantity of excavated material originating from the proposed HEx depot that will require off-site disposal to landfill is the forecast quantity of contaminated excavated material (i.e. unacceptable material classes U1B[17] and U2[18]) that is chemically unsuitable for reuse within the AP2 revised scheme, which will be taken directly from the proposed HEx depot for off-site disposal to either non-hazardous or hazardous landfill.

2.6.9 An assessment of the likely significant environmental effects associated with the disposal of CDEW and worker accommodation site waste has been undertaken for the AP2 revised scheme as a whole, including the construction of the proposed HEx depot. See the SES and AP2 ES Volume 3, Route Wide Effects, Section 19 for further information.

2.7 System testing and commissioning

2.7.1 After completion of construction works, including overhead line and signalling systems installations, the proposed HEx depot and associated trackwork will be fully tested to ensure it can operate safely and reliably. The period of testing, commissioning and trial operation is expected to take place over approximately one year, commencing in early 2019, with depot building commissioning being completed ahead of the rail systems commissioning.

2.7.2 The overall testing and commissioning strategy of the railway systems elements will be completed in the following three phases:

- phase 1: the connections to the Iver West Junction will be commissioned in early 2019;
- phase 2: the HEx depot will be tested and commissioned towards the end of 2019; and
- phase 3: handover and acceptance of the area by late 2019.

2.7.3 With the majority of the construction works to the proposed HEx depot being carried out offline, the testing and commissioning is expected to require minimal disruption to the operation of the railway.

2.7.4 The testing and commissioning of the depot facilities will occur in the following order:

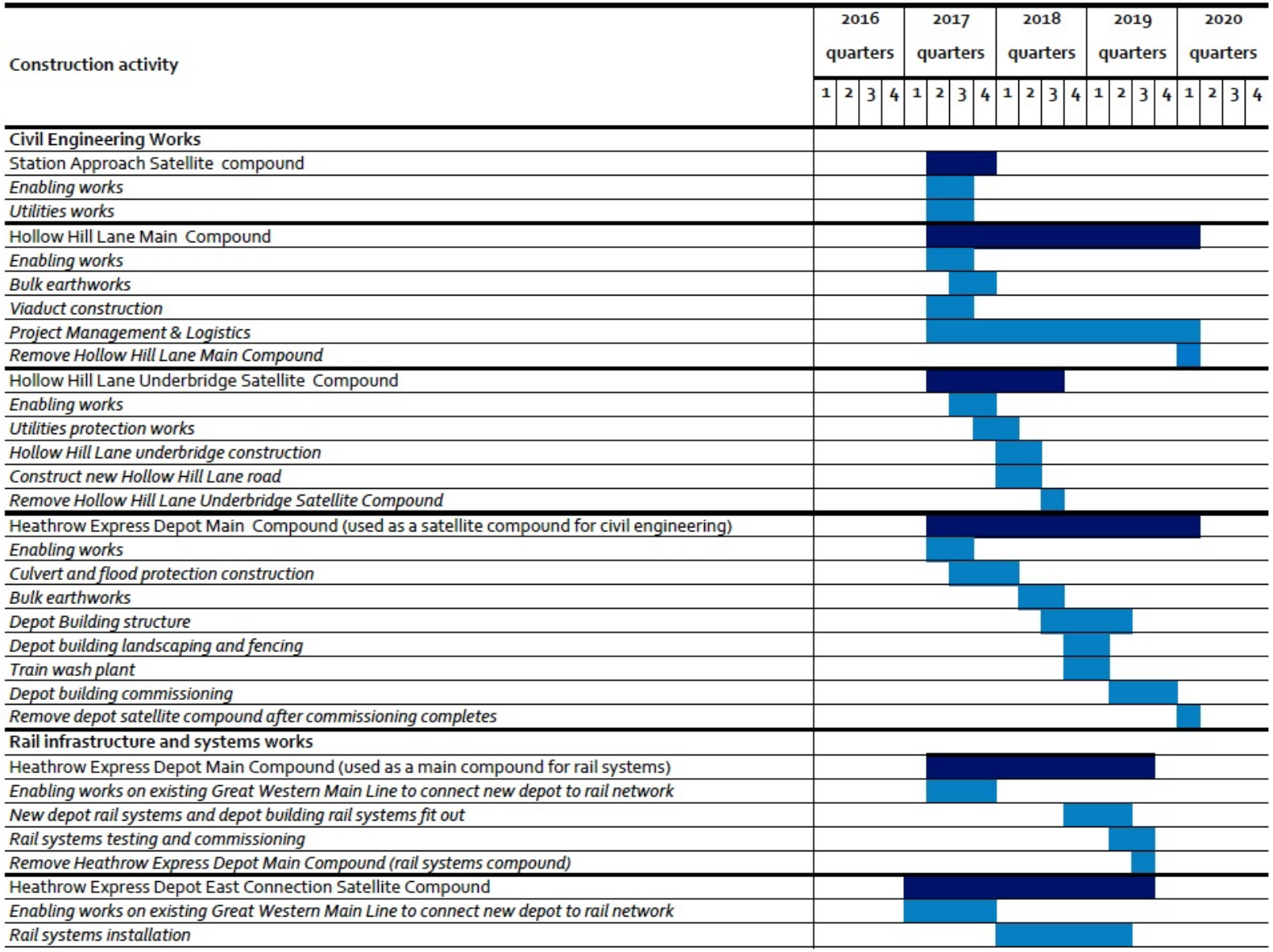
- overhead line equipment supply;
- plant room and train wash unit;
- utility connections; and
- depot building and external works.

[17] Unacceptable material Class U1B is 'chemically' unsuitable as defined in the Specification for Highway Works, Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clause 2(ii) (a).
[18] Unacceptable material Class U2 'hazardous waste', as described in the Specification for Highway Works, Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clause 3(i).

2.8 Construction programme

2.8.1 A construction programme that illustrates indicative periods for the construction activities described within this section is provided in Figure 5.

Figure 5: Construction programme



2.9 Operation of the AP2 revised scheme

2.9.1 The proposed HEx depot will fulfil the requirements of the following core activities:

- overnight train stabling;
- daily train services including train washing, cleaning, CET services and preparation of rolling stock over night;
- emergency breakdown services including standby replacement of failed rolling stock along with emergency repairs to expedite the return of trains safely back into service; and
- planned maintenance including scheduled services and maintenance activities.

2.9.2 The proposed HEx depot will accommodate up to 19 electric trains to meet a service expected to operate from 05:10 until 23:25 Monday to Saturday and from 06:25 until 23:25 on Sundays.

2.9.3 During the day there will typically be five trains in the depot. One train will be kept ready to enter service in the event that a train in service fails. A further train will be available and would additionally be prepared for service if required. Up to three further trains will be in maintenance. The remaining 14 HEx trains will be used in service throughout the day and only visit the depot at driver shift change and at the end of the day.

2.10 Operational waste and material resources

2.10.1 The existing HEx depot at Old Oak Common is already operational. The HEx depot when relocated to Langley is not expected to give rise to significant quantities of additional operational waste.

2.10.2 The only effect will be as a result of the waste arising at the new location requiring collection and off-site treatment and/or disposal. Given the minimal waste quantities expected to be generated, no significant effect will arise from the HEx depot operational waste.

2.11 Scope of the environmental assessment

2.11.1 The required land for the proposed HEx Depot at Langley is not included within the existing limits of the Bill and was not assessed within the main ES. The proposed temporary and permanent use of the land at Langley is considered to make changes requiring assessment for: agriculture, forestry and soils; air quality, community; cultural heritage; ecology; land quality; landscape and visual assessment; socio-economics; sound, noise and vibration; traffic and transport and water resources and flood risk.

2.12 Agriculture, forestry and soils

Scope, assumptions and limitations

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

2.12.2 The methodology used for assessing the impact of the development on agricultural land follows the same principles as were adopted for the main ES in urban CFAs where the areas of agricultural land required were small. As before, this assessment of the effect on agricultural land considers its overall grade, and the prevalence of best and most versatile land in the area and the absolute area of land required.

Baseline

Existing baseline

2.12.3 The bedrock geology mapped by the British Geological Survey (BGS) consists of the Thames Group of clay, silt, sand and gravel. These are overlain by superficial deposits of riverine sand and gravel, which in turn are overlain by aeolian (wind-blown) silt deposits that form the soil parent material.

2.12.4 The Soil Survey of England and Wales 1:250,000 scale soil map shows the depot site to be non-agricultural, bordering on Park Gate soils to the north and Hamble 2 soils to the south. Both soil associations (types) are characterised by aeolian, fine silty or loamy topsoils, with Park Gate overlaying poorly permeable clay subsoils and Hamble 2 overlaying well drained, similarly fine loamy subsoil.

2.12.5 In this area the deep, aeolian, fine silty or loamy Park Gate soils are moderately to poorly permeable and moderately to poorly drained (Wetness Class (WC) III or IV), whereas the freely draining Hamble 2 soils are of WC I. Hamble 2 soils can provide relatively easy cultivation and there are often long periods in autumn when they can be safely worked, but the drainage status is critical to their farmability.

2.12.6 As a detailed survey has not been possible due to access restrictions, the assessment of Agricultural Land Classification (ALC) has been carried out according to the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines (1988)[19] using available background data. The main factors affecting the classification of the land at this site are soil droughtiness and wetness which are likely to restrict the land to no better than Subgrade 3a. In addition, some of the site has previously been used for landfill with the quality of the restoration unknown. However, it is unlikely that this land has been restored to better than Subgrade 3a.

2.12.7 Based on publicly available information it would appear that one holding would be affected by the proposed HEx depot. The land is currently used for arable production and sown with combinable crops. The field to the west of Hollow Hill Lane has had an area of topsoil stripped back to form low bunds.

2.12.8 As interviews with affected farmers have not been possible, assumptions have been made using publicly available information from 2007[20]. This showed that, at that time, the holding was farming approximately 1,600ha over an extensive area on owned land as well as that on various tenancy and share-farming agreements. The holding also undertook a number of farm diversification operations including shoots, fishing, bee keeping and industrial lets.

2.12.9 An area of scrubby woodland is located to the west of the construction boundary.

[19] MAFF (1988). Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. MAFF Publications.
[20] J. Raynor and Sons http://www.jraynerandsonsltd.co.uk

Future baseline

Construction (2017)

2.12.10 No committed developments have been identified in this local area that will materially alter the baseline conditions for agriculture, forestry and soils.

2.12.11 Most existing environmental stewardship agreements will expire in 2015 and be replaced by a new environmental land management scheme (countryside stewardship) that is voluntary but competitive. It is more targeted than previous schemes, with its priorities being to protect and enhance biodiversity and water quality.

2.12.12 The widespread basic environmental management associated with entry level stewardship will be replaced by a new concept of greening introduced by Common Agricultural Policy reform, which will now be the main means by which farmers will provide environmental benefits in return for their direct support payments. Greening will encourage the retention of permanent grasslands, greater crop diversification and the creation of Ecological Focus Areas. These changes will affect the detailed management of individual farm holdings, but are not expected to change fundamentally the baseline circumstances described.

Operation (2020)

2.12.13 No committed developments have been identified in this local area that will materially alter the baseline conditions in 2020 for agriculture, forestry and soils.

Effects arising during construction

Avoidance and mitigation measures

2.12.14 Following construction, agricultural land not required permanently will be restored to its former use. Restoration will be undertaken following the best practice guidance for handling soil, as set out in section 6 of the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES). The soil handling will include stripping and storing all topsoil and reinstating it on land required for temporary works.

2.12.15 Soils generated from land that is permanently required will be conserved and used in other areas of the scheme for agricultural land restoration and for engineering purposes.

2.12.16 Compliance with other relevant parts of section 6 of the draft CoCP during construction, including provision of alternative field access to land not required during the construction phase and to land reinstated to agriculture after construction, will reduce environmental impacts.

Assessment of impacts and effects

Temporary effects

2.12.17 During the construction phase, the total area of agricultural land required by this amendment will be approximately 10.9ha. Of this, approximately 4.9ha will be restored and available for agricultural use following construction. Using the same assessment methodology as used in the main ES, as all of the land required for construction of this amendment is assumed for the purposes of the assessment to be

best and most versatile (BMV) land in Subgrade 3a, the temporary disturbance of approximately 10.9ha during construction is assessed as an impact of high magnitude. BMV land in this area is a receptor of low sensitivity (as it is prevalent in the area). Therefore the temporary effect arising from this amendment on BMV land is assessed as a moderate adverse effect, which is significant.

2.12.18 All of this land accounts for less than one percent of the holding of which it forms part. The loss of this land during the construction phase would have a negligible effect on the affected holding and is not significant.

Permanent effects

2.12.19 The permanent change of approximately 6.0ha of land of BMV agricultural land to a non-agricultural use is assessed as an impact of low magnitude, as it falls below the 10ha threshold as set out in the SMR Addendum. As stated previously, BMV land in this study area is a receptor of low sensitivity and thus the permanent effect on BMV land is assessed as a negligible effect of the revised scheme and is not significant.

2.12.20 The construction of the proposed amendment would permanently remove approximately 6.0ha of land from the farm holding and is assessed as a negligible effect and is not significant.

Other mitigation measures

2.12.21 No additional mitigation measures are proposed for this amendment.

Cumulative effects

2.12.22 As no relevant development has been identified in this study area that will affect agriculture, forestry or soils there are no cumulative effects to report.

Summary of likely residual significant effects

2.12.23 No significant residual effects on agriculture, forestry and soils have been identified.

Effects arising during operation

Avoidance and mitigation measures

2.12.24 No measures are required to mitigate operational effects of the proposed HEx depot on agriculture, forestry and soils.

Assessment of impacts and effects

2.12.25 The only potential impact arising from the operation of the proposed HEx depot is the propensity of operational land to harbour noxious weeds.

2.12.26 The inclusion of this amendment will not generate any significant impacts to agriculture, forestry and soil receptors during the operation of the scheme.

Other mitigation measures

2.12.27 No mitigation measures are proposed.

Cumulative effects

2.12.28 No relevant development has been identified in this study area that will affect agriculture, forestry or soils so there are no cumulative effects to report.

Summary of likely residual significant effects

2.12.29 No significant residual effects on agriculture, forestry and soils have been identified for the operation of the proposed HEx depot.

2.13 Air quality

Scope, assumptions and limitations

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

2.13.2 The study area includes the area within the vicinity of the proposed HEx depot, as well as the road network potentially affected by traffic changes.

2.13.3 Since submission of the Bill, the Institute of Air Quality Management has issued new guidance on assessing the impact of construction dust emissions. The new guidance, which is summarised in SES and AP2 ES Volume 1, Introduction to the SES and AP2 ES, has been used to assess the impact of dust emissions from construction of the proposed HEx depot.

Baseline

Existing baseline

2.13.4 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. Concentrations of road traffic-related pollutants are highest alongside the major roads, such as the M4 and A4. At places very close to these roads, the airborne concentrations of the main pollutants are substantially elevated when compared to the 'urban background'.

2.13.5 Estimates for NO2, PM10 and PM2.5 concentrations have been obtained from the background concentration maps produced nationally by the Department for Environment and Rural Affairs (Defra). The Defra national maps are background concentrations and do not include the effects of individual roads.

2.13.6 The HEx depot lies within both the district of Slough Borough Council and South Bucks District Council. Slough Borough Council maintains seven automatic monitoring stations. Those most relevant to the assessment are those located at Colnbrook and Lakeside as they are closest to and are most likely to be representative of the areas surrounding the proposed HEx depot. In addition, there are approximately 39 diffusion tube sites measuring concentrations of NO2 in the two districts.

2.13.7 The data collected by the local authorities indicates that baseline concentrations of NO_2 and particulate matter (PM_{10}) in the study area are likely to be in compliance with air quality standards. Five-year concentration trends at these sites are shown in SES and AP2 Volume 5: Air Quality Appendix SES AP2 HEX-AQ-001.

2.13.8 Air quality management areas (AQMA)s have been designated for some parts of Slough Borough Council and South Bucks District Council, 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-HEx within the SES and AP2 ES, Volume 5: Air Quality Map Book).

2.13.9 Slough Borough Council designated two AQMAs at Tuns Lane and in Slough town centre along the A4 Bath Road. These AQMAs are both outside the immediate study area. South Bucks District Council has declared an AQMA across an area encompassing the M4, M25 and M40. The South Bucks AQMA lies 800m east of the site boundary, along the M25.

Receptors

Construction phase

2.13.10 Potential receptors are primarily those residential properties close to construction activity and alongside roads where traffic flows will change as a consequence of construction activity. Notable receptors in relation to construction activities at this location include properties on Market Lane, Maplin Park, Mead Avenue and at the caravan site on Mansion Lane. Further individual properties affected include Sawyers Green Farm and Wellingtons for Langley Hall, a nursery. Notable receptors near roads where traffic flows will change are Hollow Hill Lane, Market Lane and Bathurst Walk.

2.13.11 No ecological receptors in the area will be affected by air quality as a result of the construction phase.

Operational phase

2.13.12 Once operational, only receptors located on or near the diverted section of Hollow Hill Lane have the potential to be affected. These are limited to receptors on Mansion Lane and Market Lane.

2.13.13 No ecological receptors in the area will be affected by air quality as a result of the operational phase.

Future baseline

Construction (2017)

2.13.14 Future background pollutant concentrations have been sourced from Defra background maps for 2017 which predict NO_2 and PM_{10} concentrations in 2017 to be lower than in the 2012 baseline.

Operation (2020)

2.13.15 Future background pollutant concentrations have been sourced from Defra background maps for 2026 which predict NO_2 and PM_{10} concentrations in 2020 to be lower than in the 2012 baseline.

Effects arising during construction

Avoidance and mitigation measures

2.13.16 Emissions to the atmosphere would be controlled and managed during construction through the implementation of the CoCP, where appropriate. The draft CoCP includes

a range of mitigation measures that are accepted as being suitable to reduce impacts as much as practicable.

2.13.17 The assessment has assumed that the measures detailed in the draft CoCP would be implemented. Specific measures would include:

- contractors being required to control dust, air pollution, odour and exhaust emissions during construction works;
- undertaking inspection and visual monitoring after consultation 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 (including historical features), watercourses and surface drains 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 following completion of earthworks.

Assessment of impacts and effects

Temporary effects

2.13.18 Impacts from the construction of the proposed HEx depot 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 NO_2 and PM_{10}.

2.13.19 An assessment of construction traffic emissions has also been undertaken for two scenarios in the construction year 2017: without the proposed HEx Depot (do-minimum scenario) and with the proposed HEx Depot (do something scenario).

2.13.20 In the HEx depot area, dust emissions are most likely to be associated with demolition, site preparation works, construction of the depot and the use of haul routes to and from the site.

2.13.21 Given the mitigation contained within the draft CoCP, the assessment of impacts arising from dust emissions has concluded that they would be slight adverse or negligible in magnitude and that the effect would not be significant. The basis for this conclusion can be found in the SES and AP2 ES, Volume 5: Air Quality Appendix SES AP2 HEX-AQ-001.

2.13.22 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.

2.13.23 Examination of the changes in traffic flows for 2017 along the affected roads has identified some roads that meet the criteria for further/more detailed assessment.

The assessment found negligible impacts at all receptors assessed, for NO_2, PM_{10} and $PM_{2.5}$. The effects would not be significant.

Permanent effects

2.13.24 There are no permanent effects anticipated to arise during construction of the proposed HEx depot.

Other mitigation measures

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

Cumulative effects

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

Summary of likely significant residual effects

2.13.27 The methods outlined within the draft CoCP to control and manage potential air quality effects are considered effective in this location and no significant residual effects are considered likely.

2.13.28 When considering climate change, projected changes in the frequency and intensity of extreme weather events up to the end of the construction period are not considered to be sufficiently large to affect the conclusions of this assessment.

Effects arising from operation

Avoidance and mitigation measures

2.13.29 No mitigation measures are proposed during operation in relation to air quality in the proposed HEx depot area.

Assessment of impacts and effects

2.13.30 Impacts from the operation of the proposed HEx depot relate mainly to changes in the nature of traffic and the operation of small scale combustion plant. There are no direct atmospheric emissions from the operation of trains that would cause an impact on air quality; these have therefore not been assessed.

2.13.31 The assessment of operational traffic emissions has been undertaken for two scenarios in the operation year 2026: without the proposed HEx depot (do-minimum scenario) and with the proposed HEx depot (do something scenario).

2.13.32 Traffic data in the HEx depot 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.

2.13.33 No roads are predicted to have sufficiently large changes in traffic flows to meet these criteria for further assessment. Therefore, no significant effect will arise from operational traffic.

Other mitigation measures

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

Cumulative effects

2.13.35 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.

Summary of likely significant residual effects

2.13.36 No residual significant effects would be anticipated for air quality in this area during operation of the proposed HEx depot.

2.13.37 There are no significant air quality effects likely to be caused or affected by climate change.

2.14 Community

Scope, assumptions and limitations

2.14.1 The current assessment draws upon information gathered from local and regional resources.

2.14.2 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 and is consistent with the approach followed for the main ES.

2.14.3 The study area includes the area of land likely to be required both temporarily and permanently for the construction and operation of the proposed HEx depot, together with a wider corridor within which receptors or resources could be affected by a combination of significant residual effects, such as noise, poor air quality and visual intrusion. In addition, the study area has regard to the proposed routing of construction traffic and takes account of catchment areas for community facilities which could be affected by the proposed HEx depot.

2.14.4 Significantly affected community resources are shown on map CM-01-HEx in the SES and AP2 ES Volume 5: Community Map Book.

Baseline

Existing baseline

2.14.5 Baseline data on community resources was collected up to 500m from the indicative operational boundary of the proposed HEx depot.

2.14.6 The study area comprises the area west of the M25 which is predominantly urban fringe with housing estates of Langley to the south of the existing railway line. The land to the north of the existing railway line is less developed, and includes farmland and Iver Golf Club and Academy.

Langley

2.14.7 Langley is characterised by suburban housing and business areas including Langley Connect, Canal Wharf, and Langley Business Centre in the area around Langley Station. Education facilities in the area include Parlaunt Primary School, Marish Primary School, Langley Hall (Upper School) and East Berkshire College. Other community facilities in the area include Langley Pavilion Community Centre, and Langley Leisure Centre.

Grand Union Canal (Slough Arm)

2.14.8 The Grand Union Canal bisects the study area, running east-west. There are a large number of boats moored along this stretch of the canal. Most of the boats are residential moorings and some are associated with the Iver boatyard (works and sales). The canal towpath provides a recreational resource for pedestrians. Immediately to the south of the canal and to the east of Hollow Hill Lane is Mansion Lane Caravan site; a council run facility for Gypsies and Travellers.

Iver

2.14.9 The northern part of the study area extends into rural Buckinghamshire, with the village of Iver to the north-east. Iver Village Infant and Junior Schools serve the local residential area. There is a nine-hole golf course, the Iver Golf Club and Academy, to the west.

Future baseline

Construction (2017)

2.14.10 No committed developments have been identified in this area that will materially alter the baseline conditions in 2017 for the community.

Operation (2020)

2.14.11 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.

Effects arising during construction

Avoidance and mitigation measures

2.14.12 The draft CoCP includes a range of provisions that will help mitigate community effects associated with construction within this study area, including:

- appointment of community relations personnel (draft CoCP, Section 5);
- community helpline to handle enquires from the public (draft CoCP, Section 5);
- layout of construction compounds to reduce nuisance (draft CoCP, Section 5);
- where reasonably practicable, maintenance of PRoW for pedestrians and cyclists around the perimeter of construction compounds and across entry and exit points (draft CoCP, Section 5);
- monitoring and management of flood risk and other extreme weather events

which may affect community resources during construction (draft CoCP, Sections 5 and 16); and

- specific measures in relation to air quality and noise will also serve to reduce potential impacts for the neighbouring communities.

Assessment of impacts and effects

2.14.13 Details of all assessments of community resources are included in SES and AP2 ES, Volume 5: Community Appendix CM-001-004. Each assessment form presents information that explains the rationale for determining the rating for sensitivity of the affected community resource, the magnitude of impact and the assessment of significance.

2.14.14 The HEx depot will temporarily require an area of land directly south of the Grand Union Canal, between Hollow Hill Lane and the Canal Wharf Industrial Estate. The area is bounded to the south by the GWML. Some of this area is in agricultural use and some of it is in light industrial use. There is also an area of mixed deciduous woodland and grassland and is not accessible to the public. This area, which borders the Grand Union Canal, will be excavated and used as a floodplain storage area.

2.14.15 Hollow Hill Lane will remain open during the construction period and therefore communities to the north of the GWML, including Mansion Lane Caravan site, will be able to access amenities to the south of the GWML. The close proximity of the realigned section of Hollow Hill Lane to its existing alignment means there are no predicted significant permanent effects resulting from this diversion.

2.14.16 Approximately 20 properties at Mead Avenue and Maplin Park are predicted to experience in-combination effects. The combined effects include significant visual effects from construction works at the proposed HEx depot main compound, maintenance shed and associated offices, plus a significant construction noise effect from the proposed HEx depot construction earthworks. These in-combination effects will be experienced for a period of approximately four to six months.

2.14.17 There are no predicted significant effects on Iver Golf Club and Academy, or on Iver Village Infant and Junior Schools.

Cumulative effects

2.14.18 There are no temporary or permanent significant cumulative effects.

Other mitigation measures

2.14.19 No mitigation measures are proposed.

Summary of likely significant residual effects

2.14.20 The amenity of some residents in approximately 20 properties at Mead Avenue and at Maplin Park will be temporarily affected by significant visual and noise effects from the construction of the HEx depot for a period of approximately four to six months.

Effects arising from operation

Avoidance and mitigation measures

2.14.21 No specific measures have been incorporated into the proposed HEx depot design as part of the design development process to avoid or minimise adverse environmental impacts during operation.

Assessment of impacts and effects

2.14.22 No significant effects have been identified.

Cumulative effects

2.14.23 No significant cumulative effects have been identified.

2.15 Cultural heritage

Scope, assumptions and limitations

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

2.15.2 The study area, within which an assessment of all designated and non-designated assets has been carried out, is defined as the land required temporarily and permanently to construct the proposed HEx depot plus 500m.

2.15.3 Historic Environment Record (HER) data was not available for the study area and was therefore a limitation when undertaking the assessment. In the absence of HER data, data from the online Heritage Gateway[21] was utilised to provide information relating to the potential archaeological assets that may be present. The Heritage Gateway holds a summary of HER data as well as data from the English Heritage Pastscape and National Monument Record Excavation Index for the study area. However, the datasets on Heritage Gateway represent a summary of the HER, and may not include the most up-to-date data.

Baseline

Existing baseline

2.15.4 In compiling this assessment, documentary baseline data was collected from a variety of sources as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 -000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES.

2.15.5 In addition, a walk-over and site reconnaissance was undertaken from areas of public access to ascertain the character and form of heritage assets and the historic landscape, to review the setting of assets, to identify previously unknown assets, and to assess past development impacts.

[21] www.heritagegateway.org.uk

Designated assets

2.15.6 There are no designated assets within the proposed HEx depot location. The following designated heritage assets are located within 1km of the proposed HEx depot location (see map CH-02-HEx in Volume 5: Cultural Heritage Map Book):

- a Scheduled Monument comprising 'Two concentric ditches showing as crop marks at Thorney' (asset reference LAN001);
- Grade I listed Church of St Mary's, Langley (asset reference LAN026);
- Grade II* listed buildings at:
  - 12, 14, 16, 18, 20, 22, St Marys Road (Almshouses), Langley (asset reference LAN022); and
  - 2,4,6,8, St Marys Road (Almshouses), Langley (asset reference LAN019).
- Grade II listed buildings at:
  - The Harrow Public House (asset reference LAN002);
  - wall approximately 5m to east of Langley Hall (asset reference LAN003);
  - Langley Hall (asset reference LAN004);
  - wall approximately 20m to north-west of Langley Hall (asset reference LAN005);
  - wall adjoining Langley Hall (asset reference LAN006);
  - Moat House (asset reference LAN007);
  - barn to north of Moat House (asset reference LAN008);
  - Houblone Tomb approximately 1 metre to East of North Chapel of Church of St. Mary (asset reference LAN020);
  - Webb Tomb approximately 12 metres to South-West of Nave Of Church Of St. Mary (asset reference LAN021);
  - Stable Range at Thorney Farm (asset reference LAN023);
  - Iver Court Farmhouse (asset reference LAN024);
  - The Red Lion Public House(asset reference LAN025);
  - Ive Tomb approximately three metres to the North of North aisle of Church of St Mary (asset reference LAN027);
  - Thorney House (asset reference Lan028);
  - The Tower Arms Public House (asset reference LAN029);
  - Chest Tomb approximately 36 metres to the north of North Aisle of Church of St Mary (asset reference LAN038);
  - Seymour Tomb adjoining south transceptal chapel of Church of St. Mary (asset reference LAN040); and

- Granary at Tithe Court, Slough (asset reference LAN040); and
- St Mary's, Langley Conservation Area (asset reference LAN030).

Non-designated assets

2.15.7 The following non-designated assets of moderate value lie wholly or partially within the land required temporarily or permanently, for the construction of the proposed HEx depot:

- lower Palaeolithic flint implements including 19 axeheads and four retouched flakes recovered from the 'Great Western Pit' (asset reference LAN009);
- lower Palaeolithic flint implements including flint scrapers, three handaxes one roughout axehead, six retouched flakes and a Levallois core, recovered during the construction of the Slough Arm of the Grand Union Canal (asset reference LAN010); and
- four Lower to Middle Palaeolithic flint handaxes found during railway cutting for the Great Western Railway (asset reference LAN011).

2.15.8 The following identified non-designated assets of low to negligible value lie wholly or partially within the land required temporarily or permanently, for the construction of the proposed HEx depot:

- site of the 20th century Hollow Hill Gravel Pit (asset reference LAN012);
- site of late 19th century 'Great Western Gravel Pit' (asset reference LAN013);
- Great Western Railway (asset reference LAN014);
- unnamed pit and tramway, within the former local nature reserve (asset reference LAN015); and
- Slough Arm of the Grand Union Canal (asset reference LAN016).

Cultural heritage overview

2.15.9 A cover of made ground is likely to be present over the majority of the area due to historical development and mineral extraction. In particular, the land between the Grand Union Canal and railway approach to Langley Station is expected to have a significant cover of made ground, which may have been affected by these previous land uses.

2.15.10 Borehole logs indicate that a cover of made ground up to depths of approximately 1m below ground level is present across much of the area required by the proposed HEx depot.

2.15.11 The superficial geology in the area consists of Thames Terrace deposits, comprising Langley Silt Member (clay and silt) and Taplow Gravel Formation (sands and gravel) in the area between Langley Station and the Grand Union Canal, with Lynch Hill Gravel Member (sands and gravel) to the east of Market Lane. The gravel deposits have shown the potential to contain Lower to Middle Palaeolithic deposits. The Lower to Middle Palaeolithic in Britain (500,000 BC to 40,000 BC) relates to the period of advanced hominids living in the Britain before modern humans (see below). The

geology is overlain by loamy soils with shallow groundwater. This type of soil would historically lend itself to arable agriculture or woodland.

2.15.12 The London Clay Formation underlies the superficial deposits under the study area.

2.15.13 The construction of the Great Western Railway (asset reference LAN011) and the Slough Arm of the Grand Union Canal (asset reference LAN010) in the 19th century and the extraction of gravel/brickearth (asset reference LAN009) during the late 19th early 20th centuries led to the discovery of a large number of Lower to Middle Palaeolithic worked flints (800,000 BC to 40,000 BC) within the area required by the proposed HEx depot. A substantial number of flint implements have been recovered from gravel pits and brick pits to the north of the canal and south of the railway, outside of the proposed depot area.

2.15.14 These Palaeolithic flint implements were discovered in the gravels beneath the Langley Silt Complex and indicate hominid (early man) activity within the wider study area during the warmer (interglacial) phases of the Hoxian (423,000 BC to 380,000 BC) and Wolstonian (380,000 BC to 130,000 BC) glacial periods. These flints were potentially washed in to the Thames Valley group gravels during the intervening cold phases.

2.15.15 A single Mesolithic tranchet axe (asset reference LAN017) is recorded as being found in the area of Langley Station 50m to the south-east of the proposed HEx depot. Neolithic to Bronze Age flints have also been recovered in the wider study area to north of the canal, at the former site of 'Lavender Pit' (asset reference LAN018). These finds may indicate Mesolithic to Bronze Age anthropogenic activity across the wider landscape.

2.15.16 The study area during the Iron Age/Roman period lay within the civitas of the Catuvellauni tribe. The pattern of Roman rural settlement in the area was likely to have been one of dispersed agrarian villas and farmsteads. However, no evidence of Roman or Iron Age activity has been identified within the study area.

2.15.17 Material culture is drastically reduced in the early medieval period (410 AD to 1066 AD) as handmade pottery does not survive well in plough soils and coinage is only present reliably from c. AD 700 and even then is very rare. Much of the evidence for the 5th to 7th centuries comes from cemeteries, although place names can also be a very useful indicator of settlement activity of this period. Documentary evidence suggests that early medieval settlement was becoming more extensive by the 8th century AD; there are references in Anglo-Saxon charter of a settlement at Iver (3km to the east of the study area). Iver was a very large and well established settlement in 1086 at the time of the Domesday Survey.

2.15.18 Forests have been identified as characteristic feature of the early-medieval and medieval landscape of the part of the Thames valley in which the study area is located. The Saxon royal forest of Wyrardisbury (Wraysbury) remained a Crown possession after the conquest and became part of Windsor Great Park. This wooded environment of royal estates, subject to separate forest laws, was primarily south of the Thames, but extended as far north as Langley.

2.15.19 The nearest historic settlement is Langley Marsh, which is not recorded in the Domesday Survey but has a church that dates from the 12th Century (asset reference LAN026). There is also evidence for medieval moated sites in the wider landscape.

The nearest is the Thorney moat site (asset reference LAN001) located approximately 400m to the south-east of the proposed HEx depot access road. The Thorney site has a moat and associated earthworks including a fishpond, although the associated (medieval) house no longer survives. It is also locally known for a civil war connection.

2.15.20 A second potential medieval moated site is located 400m to the north of the proposed HEx depot at Parsonage Farm. The moat is not Scheduled but does contain the Grade II listed 16th century 'Moat House' (asset reference LAN007) and an associated Grade II listed 16th/17th century barn (asset reference LAN008).

2.15.21 The 1813 Langley Marsh enclosure map depicts the western half of the proposed HEx depot area. This map shows the area as comprising agricultural land, indicating that the study retained its rural character form the medieval period. The Langley historic settlement core around St Mary's Church (asset reference LAN030) is depicted some 900m to the east of the proposed HEx depot and a further smaller settlement area (Langley Marsh) is depicted 400m to the south-east around the area of Langley Hall (asset reference LAN004).

2.15.22 The mid to late 19th century saw a significant change in the rural character of the study area including the construction of the Great Western railway (asset reference LAN014) in the late 1830's and the construction of Langley Station in the 1845. This led to the urban growth of Langley and the commencement of industrial and aggregate extraction activities.

2.15.23 In 1882 the Slough Arm of the Grand Union Canal (Located along the northern edge of the proposed HEx depot (asset reference LAN016)) was opened. The canal was constructed to connect Slough to the Grand Union Canal and enabled the transport of aggregate and bricks from the brickfields and gravel pits along its route. In the early 20th century the canal was utilised to transport landfill to the redundant pits.

2.15.24 The 1899 Ordnance Survey map (Epoch 2, 1:2500) identifies a gravel pit (potentially the 'Great Western Pit' (asset reference LAN013)), in the area of the proposed access route from Thorney Lane South. Langley Brick Works is depicted in the same map directly north of the gravel pit (and Slough Canal arm). Further pits are depicted within the area of the proposed HEx depot comprising:

- Hollow Hill Lane Pit (asset reference LAN012) depicted on the 1970 Ordnance Survey (1:2500), to the east of Hollow Hill Lane; and
- an unnamed pit (asset reference LAN015) shown in what is now the northern half of the local nature reserve on the 1936 Ordnance Survey (1:2500). A tramway is shown linking the canal and railway through this area in the 1924 Ordnance Survey (1:2500).

2.15.25 In addition to the gravel pits identified within the proposed HEx depot, a number of gravel and brick pits are depicted to the north of the canal and south of the railway through the late 19th and early 20th century. This would have had an effect on the archaeological potential of the study area and may have removed some of the in situ remains. Within the proposed HEx depot area only the agricultural field to the west of Hollow Hill Lane and the southern half of the local nature reserve have not been impacted by mineral extraction or by modern development. The area to the west of the nature reserve is depicted as the site of a former oil storage depot recorded on the

1972 Ordnance Survey (1:1250). There are a large number of storage tanks, an electricity substation and various unmarked buildings marked on the map. There are further industrial buildings shown in this area.

Future baseline

Construction (2017)

2.15.26 None of the identified future committed developments affect the assessment of the likely construction impacts on heritage assets for the proposed HEx depot.

Operation (2020)

2.15.27 No committed developments have been identified in this local area that will materially alter the baseline conditions in 2020.

2.15.28 None have been identified which will alter the condition of any cultural heritage assets in a manner which affects the assessment of the proposed HEx depot's likely impacts and effects.

Effects arising during construction

Avoidance and mitigation measures

2.15.29 The draft CoCP sets out the provisions that will be adopted to control effects on cultural heritage assets. The provisions include the:

- management measures that will be implemented for assets that are to be retained within the land required for the construction of the proposed HEx depot (draft CoCP, Section 8);
- 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).

2.15.30 The following design measures have been incorporated into the design of the proposed HEx depot to reduce impacts on assets:

- woodland habitat creation and landscape planting along the northern side of the scheme will consolidate existing bands of woodland to provide a visual screen to the proposed HEx depot from the direction of Moat House (asset reference LAN007) and Moat House Barn (asset reference LAN008).

Assessment of impacts and effects

Temporary effects

2.15.31 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,

temporarily or permanently, for the construction of the proposed HEx depot and assets in the wider study area due to the visibility of plant, cranes and equipment and other construction factors.

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

Cumulative effects

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

Permanent effects

2.15.34 The following significant effects will occur as a result of physical impacts on heritage assets within the land required, temporarily or permanently, for construction of the proposed HEx depot.

2.15.35 The Thames Terrace deposits (Langley Silt Member/Taplow Gravels) within the area of the new proposed HEx depot, will be truncated by the construction of the depot, rail embankments, Hollow Hill Lane bridge temporary, access road, and temporary construction compound and satellite construction compound. The Thames Terrace deposits have been shown to contain Palaeolithic remains (asset references LAN009, LAN010 and LAN011) of moderate significance. Removal of any in situ buried archaeological remains of Palaeolithic date will constitute a high adverse impact resulting in a major adverse effect.

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

Cumulative effects

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

Other mitigation measures

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

Summary of likely residual significant effects

2.15.39 As no mitigation beyond that described has been identified, the residual effects are the same as those reported in the permanent effects section.

2.15.40 Removal of any in situ buried archaeological remains of Palaeolithic date will constitute a high adverse impact resulting in a major adverse effect.

Effects arising from operation

Avoidance and mitigation measures

2.15.41 No measures will be required to reduce the impacts and effects on assets.

Assessment of impacts and effects

2.15.42 The assessment considers the proposed HEx depot 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 HEx depot.

2.15.43 No significant effects will occur as a result of operational effects on the setting of designated heritage assets.

Cumulative effects

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

Other mitigation measures

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

Summary of likely residual significant effects

2.15.46 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.

2.15.47 No significant residual effects from the operational stage have been identified in this assessment.

2.16 Ecology

Scope, assumptions and limitations

2.16.1 The assessment scope, key assumptions and limitations, and the methodology for determining significance of effects is as set out in Volume 1 of the main ES, the SMR (Volume 5: Appendix CT-001-001) of the main ES, and the SMR Addendum (Volume 5: Appendix CT-001-000/2).

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

2.16.3 The ecological baseline of the land required for this amendment has been based on information gathered through desk-study and field survey of the land required and of surrounding sites, carried out in March 2015 as part of the AP2 ES. Desk-based information for the Langley area from the Buckinghamshire and Milton Keynes Environmental Record Centre and the Thames Valley Record Centre was requested, but was still awaited at the time of the assessment, and therefore has not been considered within the assessment. To address any limitations in data, a precautionary baseline has been considered, according to the guidance reported in the main ES,

Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment.

2.16.4 Access was not obtained to all of the land area where general habitat surveys (Phase 1 habitat survey) were proposed. Locations with the potential to support key ecological receptors where access could not be gained for survey include part of the land immediately to the west of Hollow Hill Lane, and the existing Network Rail estate that lies within the land required for the HEx depot.

2.16.5 The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the proposed HEx depot works.

Baseline

Existing baseline

2.16.6 The land required for the construction of the HEx depot and that adjacent to it comprises a suburban environment including a mosaic of habitats with scrub, woodland and scattered trees, grassland, including along the existing GWML railway corridor, watercourses such as the Grand Union Canal and Horton Brook, waterbodies (for example, ditches and ponds), agricultural fields, light industrial areas and roads.

Designated sites

2.16.7 There are no statutory designated sites relevant to the assessment.

Non statutory sites

2.16.8 There are no non-statutory designated sites located within 500m of the land required for the amendment.

Habitats

Habitat mosaic

2.16.9 The habitat types that occur on, or adjacent to the proposed HEx depot site, and are relevant to the assessment, largely comprise mosaics of habitats including varying complexes of woodland, scrub, semi-improved neutral grassland, tall ruderal vegetation, ephemeral/short perennial, waterbodies/watercourses in differing proportions. These complexes include priority habitat types in the local Biodiversity Action Plans, habitats of principal importance, and are valued as up to district/borough importance.

2.16.10 Only one pond (a concrete lined former attenuation pond) was recorded in the land required for the proposed HEx depot that was accessible to the survey. The pond was partly silted up and supported willow (Salix species), bulrush (Typha latifolia) and soft rush (Juncus effusus). There was a discharge pipe from the pond into Horton Brook, but water flow from the Brook into the pond is only likely to occur during periods of exceptional water flow. At least six ponds, seven water filled ditches, and 15 water filled scrapes were also identified during the site visit to land adjacent to the depot site, to the west of Thorney Lane South.

2.16.11 The mosaic included small and scattered areas of semi-natural broadleaved woodland occur in the central part of the land required for the proposed HEx depot, and adjacent to it in an area west of Thorney Lane South. In both locations the woodland occurred

along with areas of scrub and semi-improved neutral grassland. Access was not available to much of the mosaic area in the central part of the land required for the HEx depot; however, accessible small areas of woodland were dominated by pedunculate oak (Quercus robur), with an understorey of hawthorn (Crataegus monogyna) and elder (Sambucus nigra), and a ground cover of ivy (Hedera helix) and honeysuckle (Lonicera periclymenum). Further east the ground was wetter and the woodland was dominated by crack willow (Salix fragilis) along with hawthorn and some blackthorn (Prunus spinosa).

2.16.12 Areas of dense and scattered scrub occur throughout the mosaic in the land required for the proposed HEx depot, with a more continuous belt of scrub east of Hollow Hill Lane (although it could not be accessed), and further east adjacent to Thorney Lane South. In accessible areas the scrub was predominantly hawthorn, blackthorn and brambles (Rubus fruticosus agg). Regenerating trees such as elm (Ulmus procera) and ash (Fraxinus excelsior) were present in places, as well as dog rose (Rosa canina), and tall ruderals especially common nettle (Urtica dioica). Scrub was encroaching into the semi-improved neutral grassland, and in places where concrete rubble was evident, bramble and butterfly-bush (Buddlaja davidii) were more dominant.

2.16.13 Areas of semi-improved neutral grassland were present within the habitat mosaic on the land required for the proposed HEx depot. In accessible areas it was found to be of typically rank character with frequent coarse grasses.

2.16.14 Horton Brook adds to the habitat mosaic as it crosses the land required for the proposed HEx depot. In accessible areas it comprised a narrow channel often choked with bulrush (Typha latifolia), and with false fox sedge (Carex otrubae), water mint (Mentha aquatica) and willowherb species (Epilobium spp) in places. The banks were lined with hawthorn and bramble scrub. At least seven ditches and streams were recorded in the mosaic of habitats in land adjacent to the HEx depot site, west of Thorney Lane South. These watercourses were typically small (approximately 1 m wide) and eutrophic.

2.16.15 Another part of the mosaic was previously developed land within the land required for the HEx depot east of Langley station, which supported ephemeral/short perennial vegetation, with some low-lying areas subject to water-logging. This graded into grassland in places, but the sward was generally open and comprised a mixture of grasses (*e.g.* red fescue (*Festuca rubra*), creeping bent (*Agrostis stolonifera*), Yorkshire fog (*Holcus lanatus*), cock's-foot (*Dactylis glomerata*), false oat-grass (*Arrhenatherum elatius*)), herbs (*e.g.* creeping cinquefoil (*Potentilla reptans*), common mouse-ear (*Cerastium fontanum*), hairy bittercress (*Cardamine hirsuta*)), mosses (*e.g.* pointed spear moss (*Calliergonella cuspidate*)), scattered tall ruderals (*e.g.* mugwort (*Artemisia vulgaris*), wild mignonette (*Reseda lutea*), teasel (*Dipsacus fullonum*)), and shrub saplings (*e.g.* grey willow (*Salix cinerea*)). This area (approximately 1ha) is likely to qualify as Section 41 habitat 'open mosaic habitat on previously developed land'. An area of cleared scrub west of Thorney Lane South, in land adjacent to the proposed HEx depot, comprised bare ground in the process of colonisation by opportunistic ruderals including thistles, willowherbs and rank grassland.

Other watercourses

2.16.16 The Grand Union Canal Slough Arm is adjacent to the land required for the HEx depot. It is characteristically steep-sided and eutrophic, with adjacent habitats including

grassland, scrub, tall ruderal, and scattered mature trees which shade approximately 50% of the channel. The banks of the canal are sheet-piled in places. This stretch of the canal in Slough is not designated and is of only local/parish value.

Arable

2.16.17 Areas of arable land occur between these mosaics. Arable fields, of only local/parish importance, covered much (approximately 15 ha) of the eastern half of the land required for the HEx depot, either side of Hollow Hill Lane.

Other built land

2.16.18 Numerous buildings, areas of hard-standing, and railway tracks are present on the land required for the HEx depot, but they are of no ecological value.

Protected and/or notable species

2.16.19 A summary of the species relevant to the assessment is provided in Table 2.

Table 2: Protected and/or notable species

Species/species group	Value	Receptor	Baseline and rationale for valuation
Great crested newt	Up to county/metropolitan	Potential great crested newt population at land to the west of Thorney Lane South, adjacent to the land required for the proposed HEx depot.	A habitat suitability index assessment of one of the ponds in this area indicates that they are likely to be suitable for great crested newt. Given the presence of suitable aquatic and terrestrial habitat a reasonable precautionary prediction assumes a medium population of great crested newts is present. Great crested newt is a species of principal importance.
	Up to county/metropolitan	Potential great crested newt population in attenuation pond on land to the east of the Canal Wharf Industrial estate, in the land required for the proposed HEx depot.	A habitat suitability index assessment of this pond indicates that it is likely to be suitable for great crested newt. Given the presence of suitable aquatic and terrestrial habitat a reasonable precautionary prediction assumes a medium population of great crested newts is present. Great crested newt is a species of principal importance.
Common reptiles	Up to district/borough	Populations of common reptiles at land west of Hollow Hill Lane in the land required for the proposed HEx depot.	Suitable habitats for common reptiles including rough grassland, scrub and open mosaic habitat are present. Given the extent of the habitats present, and following a precautionary approach, it is considered that a medium population of common reptiles is present. Reptile species are species of principal importance and listed as priority species on the Berkshire BAP.

Species/species group	Value	Receptor	Baseline and rationale for valuation
	Up to district/borough	Populations of common reptiles in land west of Thorney Lane South adjacent to the land required for the proposed HEx depot.	Suitable habitats for common reptiles including rough grassland and scrub are present. Given the extent of the habitats present, and following a precautionary approach, it is considered that a medium population of common reptiles is present. Reptile species are species of principal importance and listed as priority species on the Berkshire BAP.
Birds	Up to district/borough	Breeding bird assemblages on land required for the Hex depot.	Habitats in the land required for the HEx depot and adjacent to it are likely to support predominantly common and widespread breeding bird assemblages, but may include species of principal importance and species listed on the Berkshire BAP.
Bats	Up to district/borough	Potential bat roosting location in woodland to the north of the pond east of the Canal Wharf Industrial Estate, and in buildings west of Thorney Lane South. Between the Canal Wharf Industrial Estate and Hollow Hill Lane, there is potential foraging and roosting habitat.	A small number of trees on the land required for the HEx depot were identified as having the potential to support bat roosts. It is unlikely that these trees support maternity roosts of common species, or roosts of rarer bat species. Given the areas of inaccessible land appeared to be a continuation of this habitat, a precautionary value has been given. Suitable foraging habitat is also present in land to the west of Hollow Hill Lane and along the railway corridor.
Terrestrial invertebrates	Up to district/borough	Terrestrial invertibrates assemblages on land required for the HEx depot.	The presence of a mosaic of habitats, especially those on previously developed land, may provide opportunities for a range of terrestrial invertebrates.
Badger	Local/parish	Badger populations present in land east and west of Hollow Hill Lane, and land west of Thorney Lane South.	A badger territory has been recorded in the vicinity of the proposed HEx depot site. Badgers are widespread within the UK. Badger social groups within the study area are not likely to form a critical part of the county, or even of the district population.

Future baseline

Construction (2017)

2.16.20 A summary of the known developments which are assumed to be mostly built and occupied prior to construction of the proposed HEx depot is provided in the SES and AP2 Volume 5: Appendix CT-004-000.

2.16.21 It has been assumed that the three allocations shown in the Slough Borough Council Local Development Framework (mixed use (predominantly residential), retail (supermarket), and nature conservation (a nature reserve)) and a waste transfer facility allocation shown in the Buckinghamshire County Council's Minerals and Waste Core Strategy, which overlap land required for the HEx depot, will not proceed. Hence the existing character and value of ecological resources will remain unaffected.

2.16.22 Only one application, for a wood recycling facility (submitted in January 2015) lies on land adjacent to that required for the HEx depot, although the access road for this facility appears to overlap the land required for the HEx depot in a few places along its length. The status of this application is unknown, but it has been assumed that its access road design will take account of the HEx depot requirements, and that the existing ecological resource on this part of the land required for the HEx depot will remain unaffected.

Operation (2020)

2.16.23 There are no known committed developments in this area that will affect the operational baseline.

Effects arising during construction

Avoidance and mitigation measures

2.16.24 No specific mitigation has been included as part of the design of the proposed HEx depot to avoid or reduce impacts to features of ecological value.

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

Assessment of impacts and effects

Designated sites

2.16.26 No designated sites are affected by the proposed HEx depot.

Habitats

2.16.27 The land required for the construction of the proposed HEx depot, will result in the permanent loss of approximately 40 ha of habitat, comprising approximately 15 ha of the habitat mosaic, approximately 11 ha of arable land and 14 ha of other built land.

2.16.28 The loss of the mosaic of habitat will result in a permanent adverse effect significant at up to district/borough value.

2.16.29 It is unlikely that any other effects on habitat receptors at more than the local/parish level will occur.

Species

2.16.30 The construction of the proposed HEx depot will result in the loss of the former attenuation pond, which it has been assumed can support a medium population of great crested newts. Suitable terrestrial habitat surrounding the pond will also be lost including broad-leaved woodland, dense and scattered scrub, semi-improved grassland and open mosaic habitat on previously developed land. This would result in a permanent adverse effect on the conservation status of this assumed medium population of great crested newt that is significant at up to the county/metropolitan level.

2.16.31 The loss of habitat suitable for common reptiles in land to the west of Hollow Hill Lane and small areas of habitat in land west of Thorney Lane South would result in the

localised loss of reptile populations at land to the east of the industrial estate, and displacement to other suitable alternative habitat in the area for reptile populations at land to the west of Thorney Lane. The loss of habitat and displacement would result in an adverse effect on the conservation status of reptile populations that is significant at up to the district/borough level.

2.16.32 The loss of habitat suitable for breeding bird assemblages in land to the west of Hollow Hill Lane would result in the displacement of that assemblage to other suitable alternative habitat, which is not extensive in the local area. The loss of habitat and displacement of the assemblages would result in an adverse effect on the conservation status of breeding bird assemblages that is significant at up to the district/borough level.

2.16.33 Several trees with bat roost potential and foraging habitat predominantly west of, and around Hollow Hill Lane, and along the railway corridor, will be removed during construction. Roosts are important to the conservation status of bats by providing transitory, non-breeding and breeding sites. The loss of connecting and surrounding habitat could also affect local bat populations. The potential loss of multiple roosts for common bat species and extensive areas of foraging habitat would result in an adverse effect on the conservation status of bats that is significant at up to the district/borough level.

2.16.34 The loss of habitat suitable for terrestrial invertebrates in the land required for the HEx depot at land west of Hollow Hill Lane would result in the localised loss of assemblages and displacement to other suitable alternative habitat in the area which is limited, due to the mosaic of habitat present. The loss of habitat and displacement would result in an adverse effect on the conservation status of the terrestrial invertebrate assemblages that is significant at up to the district/borough level.

2.16.35 It is considered unlikely that any other effects on species receptors of relevance at more than the local/parish level will occur.

Other mitigation measures

2.16.36 Based on the precautionary assessment undertaken, there will be a requirement for replacement habitat to be created prior to the loss of land required for the HEx depot, so that translocation of fauna species, including great crested newt and reptiles, can be undertaken prior to the loss of their existing supporting habitat from the HEx depot site. Areas for replacement habitat creation are unlikely to be available within the HEx depot site boundary until the construction work is complete, hence additional land will be required outside the HEx depot boundary to accommodate these species if they are found to be present.

2.16.37 Appropriate offsite measures prior to construction are expected to be brought forward either in a subsequent AP, or by direct agreement with landowners. In the absence of this additional mitigation, significant residual effects will remain, at up to county/metropolitan level for the assumed medium population of great crested newts, and at up to district/borough level for the mosaic of habitats, reptiles, bats, breeding birds and terrestrial invertebrates.

2.16.38 The current proposals for on-site mitigation post construction include a mosaic of woodland, scrub and grassland habitat (approximately 9 ha), on land between the

Grand Union Canal and the northern side of the depot maintenance building, and to the west of Hollow Hill Lane, between the GWML and the proposed depot trackwork. In addition, hedgerow habitat (approximately 300m) will be created along the realigned Hollow Hill Lane, and wetland habitat (approximately 6ha). These measures will be reviewed as the offsite mitigation measures are developed. The construction programme will also be reviewed and may require amendment to accommodate the offsite creation of replacement habitat and species translocation.

2.16.39 Mitigation will be carried out in accordance with the Ecology technical note: Ecological Principles of Mitigation (main ES Volume 5: Appendix CT-001-000/2). This will be sufficient to maintain the favourable conservation status of each population affected.

2.16.40 The loss of any bat roosts in trees will be compensated for by the provision of alternative compensatory roosts in accordance with the ecology technical note: Ecological Principles of Mitigation (main ES Volume 5: Appendix CT-001-000/2).

Summary of residual significant effects

2.16.41 In the absence of developed mitigation measures prior to construction, significant residual effects will remain, at up to county/metropolitan level for the great crested newts, and at up to district/borough level for the habitat mosaic, reptiles, bats, breeding birds and terrestrial invertebrates.

Effects arising during operation

2.16.42 The effects of noise and lighting on fauna during operation of the proposed HEx depot are not expected to result in significant effects for ecological receptors.

2.16.43 Operational lighting will be required for night time working, but it has been assumed that will be of a type and design that reduces light spills. It will also be directed into the HEx depot site and away from surrounding habitats. This will minimise potential effects on bats and other sensitive species.

Summary of significant residual effects

2.16.44 No significant residual effects have been identified at the operational stage.

2.17 Land quality

Scope, assumptions and limitations

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

2.17.2 Land contamination issues are associated with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 2.22 of this report. Issues regarding the disposal of waste materials including contaminated soils are addressed in Section 2.22 of this report.

2.17.3 The main environmental features of this area relevant to land quality include the Grand Union Canal, Subgrade 3a agricultural land and River Terrace Deposits (comprising the Lynch Hill Gravel and locally the Taplow Gravel Formation).

2.17.4 The main land quality issues in this area include:

- the former oil depot used to store and distribute petroleum, diesel, kerosene and aviation fuel on site;
- the current concrete batching plant;
- the railway land to the south of the site; and
- the Iver and Hollow Hill Lane Landfills located to the east of Hollow Hill Lane.

2.17.5 Enquiries were submitted to the petroleum officer at the Buckinghamshire Fire Service to determine whether any tanks at the former oil depot were underground and still remain. However, no response was received and hence a precautionary approach to the assessment has therefore been adopted.

Baseline

Existing baseline

Geology

2.17.6 This section describes the underlying ground conditions within the proposed HEx depot site. It first describes any made ground present, followed by near surface superficial deposits and lastly describes the deeper bedrock geology.

2.17.7 The BGS geological mapping (2014) was reviewed to determine the geological conditions across the study area. Both the 1:50,000 geological map22 and the BGS borehole log23 search were utilised.

2.17.8 Made ground has not been indicated as present on the published geological maps, although a cover of made ground is likely to be present over the majority of the proposed HEx depot site due to historical development. A review of borehole logs for this area[23] indicates that a cover of made ground is present across the study area to depths of approximately 1m below ground level (BGL) (for example, borehole log number; TQ07NW908)[23].

2.17.9 In particular, the land between the Grand Union Canal and railway approach to Langley Station is expected to have a significant cover of made ground, which may have been affected by the previous existence of the former oil depot in the study area.

2.17.10 The superficial geology in the area consists of Langley Silt Member (clay and silt) and Taplow Gravel Formation (sands and gravel), in the area between Langley Station and the Grand Union Canal, with Lynch Hill Gravel Member (sands and gravel) to the east of Market Lane. Local borehole logs suggest that the superficial deposits exist to a maximum depth of approximately 9m BGL.

2.17.11 The London Clay Formation underlies the superficial deposits under the study area: this is blue-grey clay that weathers to a brown colour in its upper part. This is generally found to a maximum depth of approximately 35m BGL.

[22] http://www.bgs.ac.uk/data/mapViewers/home.html
[23] http://www.bgs.ac.uk/data/boreholescans/

2.17.12 Information from the logs of deep boreholes in the area indicates that the geological succession below the London Clay is as follows:

- the Lambeth Group (comprising the Woolwich and Reading Formations), which consists of a mixture of clay, sand and occasional pebble beds, to a maximum depth of approximately 50m BGL; and
- the Chalk Group, which is a soft white limestone, the maximum depth of which is undetermined from borehole logs in the area.

Groundwater

2.17.13 Areas of the superficial deposits to north, south, east and west of the study area are designated as Secondary (formerly referred to as Minor) aquifers by the Environment Agency.

2.17.14 The London Clay has been designated by the Environment Agency as unproductive strata (i.e. has a low hydraulic conductivity and is unlikely to bear significant water).

2.17.15 The Lambeth Group (Woolwich and Reading Formations) is designated a Secondary Aquifer by the Environment Agency but is hydraulically separated from the shallow superficial aquifer by the London Clay aquitard.

2.17.16 The Chalk Group is classified as a Principal aquifer. The uppermost formation within the Chalk Group in this study area is the Seaford Chalk Formation.

2.17.17 In general, the study area is classified as high groundwater vulnerability for a Principal Aquifer by the Environment Agency[24].

2.17.18 The western part of the site (the location of the proposed maintenance shed) is within the catchment area of a protected groundwater source in Slough source protection zone (SPZ) (SPZ3), the closest inner SPZ (SPZ1) is located approximately 5km south-west of the site, which is located in a small area of Chalk outcrop.

2.17.19 The groundwater flow direction in the superficial deposits in the study area is unknown, although it is likely to be in hydraulic connectivity with the Horton Brook (Refer to Section 3.29 of this report).

2.17.20 The groundwater level on the site of the former oil depot is approximately 5m BGL within the superficial deposits, based on existing borehole logs.

2.17.21 Further detail on the groundwater beneath the proposed HEx depot can be found in Section 2.22 of this report.

Surface waters

2.17.22 The Grand Union Canal runs from east to west to the north of the proposed HEx depot site.

2.17.23 Horton Brook flows from north-west to south-east through the western part of the study area, adjacent to the former oil depot. There are un-named drains present to

[24] http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

the north of Iver Station and north of the Grand Union Canal adjacent to Sawyers Green Farm.

2.17.24 The study area has a fluvial flood risk that ranges from Low to High within an area approximately 100m either side of the Horton Brook.

2.17.25 Further detail on the surface water in the vicinity of the proposed HEx depot can be found in Section 2.22 of this report.

Current and historical land use

2.17.26 There are a number of potentially contaminative land uses, which may have affected soils or groundwater (at least locally) within the study area.

2.17.27 Historical land uses that may have caused contamination, other than the existing railway land, include:

- a former oil depot located within the western end of the site;
- brickworks, wharves, station works, factories (both with specified and unspecified uses) and a chemical works in the industrial area located west of the proposed maintenance shed;
- Hollow Hill Lane and Iver landfill sites located east of Hollow Hill Lane and north of the Grand Union Canal; and
- several gravel pits abutting the north and south sides of the Grand Union Canal.

2.17.28 The sites identified by the review as posing a potential contaminative risk when the depot is constructed, listed from east to west and shown on map LQ-01-HEx in Volume 5: Land Quality Map Book, are:

- Mansion Lane, Hollow Lane, Langley Park Road and Langley landfills located north of the Grand Union Canal;
- Thorney Lane, Iver and Hollow Hill Lane landfills located within the area the HEx depot east connection trackwork will be constructed;
- concrete works to the east where the proposed HEx depot east connection merges with existing rail corridor;
- former engineering and brick works to the south of the proposed HEx depot west connection;
- former oil depot in the location of the proposed HEx depot; and
- industrial estate, factory, brick works and chemical works to the west of Langley Station.

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

2.17.30 Historically, the now redundant oil depot distributed oil to Heathrow Airport via a pipeline. When operational, the site was licensed for the storage of 32,080 tonnes of

automotive petrol and other petroleum spirits including motor spirit, derv (diesel fuel), kerosene and aviation fuel, and 3,346 tonnes of paraffin[25].

2.17.31 The former oil depot site has been previously identified as contaminated relating to the storage of oil/hydrocarbon products. It is understood that the site was decommissioned in 2002 and underwent a period of remediation which ceased on 20 February 2013. The site has now been classified as suitable for commercial and industrial use[26].

2.17.32 According to Environment Agency online mapping[27], there are three historical landfills located in the eastern area of the site. From east to west; Thorney Lane landfill, Iver landfill and Hollow Hill Lane landfill. Environment Agency records indicate that Hollow Hill Lane landfill was licensed to receive inert and industrial waste from factory or industrial processes between 1960 and 1969, there is no information available for Thorney Lane landfill or Iver landfill.

2.17.33 No active landfill sites have been identified within 250m of the site.

2.17.34 Information from the Environment Agency indicates there has been one pollution incident which occurred within 250m of the study area, at the intersection of the railway and Market Lane, which is classified as having a significant environmental impact. No other information is available.

Other regulatory data

2.17.35 There is no other regulatory information available.

Mining and mineral areas

2.17.36 According to the Buckinghamshire Minerals and Waste Plan, in the area of the proposed HEx depot east connection (occupied by Iver Landfill), there is a mineral safeguarding area (MSA) and mineral consultation area designation. Given the presence of the Iver landfill and limited area of the HEx depot located over the MSA, the value of the affected remnants of this mineral resource at the site is limited.

Geo-conservation sites

2.17.37 Inspection of supplementary planning guidance issued by the London Geodiversity Partnership indicates that there are no current or potential geological designations (e.g. RIGS/LIGS or Geological SSSI) within the study area[28].

Receptors

2.17.38 The sensitive receptors that have been identified within this study area are summarised in Table 3.

[25] http://www.slough.gov.uk/Moderngov/documents/s3475/k%20-%202%20Append.%202%20356%201%2011_D%20-%20QC%20Opinion%20031105.pdf
[26] http://www.slough.gov.uk/moderngov/documents/s33405/f%20Total%20Oil%20Committee%20Report%20FINAL.pdf
[27] http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e
[28] Green Infrastructure and Open Environments (2012), *London's Foundations: Protecting the geodiversity of the Capital*. Supplementary planning guidance, BGS/Natural England.

Table 3: Summary of receptors for land quality effects

Receptor Type	Receptor Description	Receptor Sensitivity
People	Residents in existing properties	High
	Rail passengers in Langley station and on passing trains	High
	Workers, e.g. construction, industrial or existing railway	Medium
	Adjacent users e.g. recreational users of the golf course or caravan parks	High
Controlled waters	Grand Union Canal	High
	Unnamed watercourses	High
	Secondary Aquifers in the superficial deposits	High
Built environment	Buildings and property	Low to high
	Underground structures and services	Low
Mineral resources	Mineral Safeguarding Area and Mineral Consultation Area	Low

Future baseline

2.17.39 As part of the assessment of potential future baselines, a search was undertaken of planning permissions within the study area. There are currently no identified committed development sites within the study area that are likely to change the land quality baseline before or during construction or operation of the proposed HEx depot scheme. Any committed development sites identified are all located outside of the land required to construct the proposed HEx depot and thus considered unlikely to be able to affect land quality within the proposed HEx depot.

Effects arising during construction

Avoidance and mitigation measures

2.17.40 The construction assessment takes into account the mitigation measures contained within the draft CoCP. The draft CoCP sets out the measures and standards of work that will be applied to the construction of the proposed HEx depot. Its requirements in relation to work in contaminated areas will ensure the effective management and control of the work. Such requirements include:

- methods to control noise, waste, dust, odour gases and vapours (draft CoCP, Sections 5, 7, 13 and 15);
- methods to control spillage and prevent contamination of adjacent areas

(draft CoCP, Section 5);

- the management of human health exposure, for both construction workers and people living and working nearby (draft CoCP, Section 11);
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated) (draft CoCP, Sections 7 and 15);
- management of any unexpected contamination found during construction (draft CoCP, Section 11);
- a post-remediation permit to work system (draft CoCP, Section 11);
- storage requirements for hazardous substances such as oil (draft CoCP, Section 16);
- traffic management to ensure that there is a network of designated haul roads to minimise compaction/degradation of soils (draft CoCP, Section 7); and
- methods to monitor and manage flood risk, and other risks from extreme weather events which may affect land quality during construction (draft CoCP, Section 16).

2.17.41 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 and a risk assessment undertaken to determine what, if any, site specific remediation measures will be required to allow the revised depot scheme to be constructed safely and to prevent harmful future migration of contaminants (draft CoCP, Section 11). The investigation and assessment of potentially contaminated sites will be undertaken generally in accordance with:

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

2.17.42 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). The preferred option will then be developed into a remediation strategy, and the regulatory authorities will be consulted prior to implementation.

2.17.43 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 HEx depot where needed and suitable for use. Treatment techniques are likely to include stabilisation methods, soil washing and bio-remediation to remove oil contaminants. Contaminated soil disposed of off-site will be taken to a soil treatment facility, another construction site (for treatment, as necessary, and reuse) or to an appropriately permitted landfill site.

Assessment of impacts and effects

2.17.44 The proposed HEx depot will comprise a large maintenance shed, offices and sidings located to the north of the existing rail corridor which historically has been occupied by an oil depot. The HEx depot main construction compound will be located to the north of the proposed maintenance shed.

2.17.45 The Station Approach satellite compound will be located adjacent to Langley rail station and the Hollow Hill Lane underbridge satellite compound south of the GWML and to west of Hollow Hill Lane. The Heathrow Express depot satellite compound will be located directly north of the proposed HEx depot. The Hollow Hill Lane main compound will be located on the former Hollow Hill Lane and Iver landfill sites, to the east of Hollow Hill Lane. A Network Rail substation is proposed on the western boundary of the HEx Depot site.

2.17.46 A floodplain storage area will be constructed to the northeast of the maintenance shed and sidings and part of this area will overlap with the former oil depot site. It is anticipated that approximately 57,700m^3 of material will be excavated. Excavation of the floodplain storage area and for the installation of Hollow Hill Lane underbridge retaining wall (1m contiguous piled wall 15m long) will take place on or close to the site of the former oil depot.

2.17.47 The section of the HEx depot east connection, crossing Iver landfill and Hollow Hill Lane landfill, will be constructed using a reinforced concrete slab supported on bored piles. Where this route crosses the historic landfill, the landfill material will be excavated to the base of the slab and replaced with inert material. Piling will not extend below the base of the London Clay. The landfill material and piling arisings will be removed for disposal off site.

Land contamination

2.17.48 In accordance with the assessment methodology, as set out in the SMR and the SMR Addendum of the main ES, an initial screening process was undertaken (identified in the methodology as Stages A and B) to identify areas of current or historical potentially contaminative use within the study area and considers which of these areas might pose contaminative risks for the proposed HEx depot scheme. In total, 28 areas were considered during this screening process, and of these, 19 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 map LQ-01-HEx in the SES and AP2 ES Volume 5: Land Quality Map Book, and those considered as potentially posing a risk to the proposed HEx depot are labelled with a reference number.

2.17.49 Conceptual site models (CSM) have been produced for the 19 sites in this area taken to Stage C and D assessments. The detailed CSM are provided in SES and AP2 ES Volume 5 Land Quality, Appendix SES AP2 HEX-LQ-001, and the results of the baseline risk assessments are summarised in this section. Potentially contaminated sites have been grouped, and considered together, where appropriate. The following factors have determined the need for a stage C and D assessment:

- whether the site is directly affected by the revised depot scheme ;
- the vertical route alignment, i.e. whether the railway is in cutting at the site's

location;

- the presence of underlying Principal or Secondary A aquifers or nearby watercourses; and
- the presence of underlying Principal or Secondary A aquifers or nearby surface water receptors.

2.17.50 A summary of the baseline CSM for the revised depot scheme is provided in Table 4. The impacts and baseline risks are described before any mitigation is applied.

2.17.51 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, reasonable worst case assumptions and may therefore report a higher risk than that which actually exists.

Table 4: Summary of baseline CSM for sites which may pose a contaminative risk for the proposed HEx depot scheme

Area reference[29]	Area name and classification	Main potential impacts	Main baseline risk[30]
HEx-01, HEx-02	Existing on-site railway land and Langley Station (AP2, Map LQ-01-HEx)	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 on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate/low
		Potential impact to groundwater within the River Terrace Deposits (Secondary A bedrock aquifer).	Moderate/low
		Potential impact to surface water in the Horton Brook	Moderate/ low
HEx-08	Former on-site oil depot (AP2, Map LQ-01-HEx)	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
		Potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust.	Very low to low
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases	Moderate/low

[29] Each area is assigned a unique identification number
[30] The moderate or high risks identified reflect the uncertainty in existing baseline information. Whilst there are unlikely to be properties or receptors that experience the reported high or moderate existing baseline risk in the absence of site investigation, a precautionary, worst case risk is reported in the table.

Area reference[29]	Area name and classification	Main potential impacts	Main baseline risk[30]
		and/or vapours.	
		Potential impact to surface water in the Grand Union Canal	Moderate/low
		Potential impact to groundwater within the River Terrace Deposits (Secondary A bedrock aquifer).	Moderate
		Potential impact to fabric of buildings and services (e.g. foundations, and water supply pipes).	Moderate/low
HEx-23, HEx-24	On-site historical landfills (AP2, Map LQ-01-HEx)	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 to groundwater within the Secondary A superficial aquifer.	Moderate
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate
HEx-22, HEx-25, HEx-26, HEx-27, HEx-28	Off-site historical landfills (AP2, Map LQ-01-HEx)	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 to groundwater within the Secondary A superficial aquifer.	Moderate/low
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate
HEx-13, HEx-06, HEx-05, HEx-09, HEx-04, HEx-16, HEx-19	Former off-site concrete works, railway land, engineering works and other previous contaminative land uses. (AP2, Map LQ-01-HEx)	Potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters.	Low to moderate/low
		Potential impact to surface water in the Grand Union Canal.	Low to moderate/low
		Potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate (rail land only)

Temporary effects

2.17.52 An assessment of the effects of contamination has been undertaken by comparing the CSM developed for potential contaminated land sites at baseline, construction and post construction stages. In order to assess effects at the construction stage, the baseline and construction CSM have been compared.

2.17.53 Table 5 presents a summary of the construction effects obtained from a comparison of the baseline and construction impacts for the revised depot scheme. The construction risk assessment assumes implementation of the mitigation measures set out within the draft CoCP.

Table 5: Summary of temporary (construction) effects

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
HEx-01, HEx-02	Existing on-site railway land and Langley Station (AP2, Map LQ-01-HEx)	Moderate / low 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 on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases. Low potential impact to groundwater within the River Terrace Deposits (Secondary A bedrock aquifer). Low potential impact to surface water in the Horton Brook.	None – receptor not present None – receptor not present Low Low	Negligible (not significant)
HEx-08	Former on-site oil depot (AP2, Map LQ-01-HEx)	Moderate potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters. Low potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust. Moderate/low potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases and/or vapours. Moderate / low potential impact to surface water in the Grand Union	None – receptor not present Low None – receptor not present Moderate/low	Moderate (significant) for impacts to Secondary A aquifer

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
		Canal. Moderate / low potential impact to groundwater within the River Terrace Deposits (Secondary A aquifer) Moderate/low potential impact to fabric of buildings and services (e.g. foundations, and water supply pipes).	Moderate Moderate/low	
HEx-23, HEx-24	On-site historical landfills (AP2, Map LQ-01-HEx)	Moderate/low 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 to groundwater within the Secondary A superficial aquifer. Moderate potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	None – receptor not present Moderate/low None – receptor not present	Negligible (not significant)
HEx-22, HEx-25, Hex-26, HEx-27, HEx-28	Off-site historical landfills (AP2, Map LQ-01-HEx)	Moderate/low 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 to groundwater within the Secondary A superficial aquifer. Moderate potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate/low Moderate/low Moderate	Negligible (not significant)
HEx-13, HEx-06, HEx-05, HEx-09, HEx-04, HEx-16, HEx-19	Former off-site concrete works, railway land, engineering works and other previous contaminative land uses. (AP2, Map LQ-01-HEx)	Low to moderate/low potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters. Low to moderate/low potential impact to surface water in the Grand Union Canal. Moderate (railway land only) potential impact on on-site	Low to moderate/low Low to moderate/low	Negligible (not significant)

Area ref	Area name	Main baseline risk	Main construction risk	Construction effect and significance
		humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate	

2.17.54 The baseline and construction CSM have been compared to determine the change in level of risk to receptors during the construction stage and thus to define the level of effects at the construction stage. Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible, even if the risk is assessed to remain as high. This will be the case where the construction of the HEx depot does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.

2.17.55 Table 7 indicates that most construction activities will have an overall negligible effect on identified receptors, which is not considered significant. With implementation of the draft CoCP the moderate-low impacts to the Secondary A aquifer will result in a negligible effect.

2.17.56 Risks to on-site human health in areas where current and historical potentially contaminative activities are affected by the proposed HEx depot are expected to be mitigated through the draft CoCP, which ensures that risks to human health will not be increased above baseline conditions and in some instances may improve during construction as remediation is progressed.

2.17.57 The satellite and main construction site compounds located within the study area will include staff welfare facilities, maintenance facilities for plant and machinery and fuel storage in bunded tanks. Construction compounds will store and use potentially contaminative materials such as fuels, oils and solvents, and the measures outlined in the draft CoCP will manage risks from the storage of such materials.

2.17.58 It is unclear whether residual hydrocarbon contamination may be present in the superficial deposits where flood compensation excavations are proposed. Should contaminated soils be encountered during excavation, this material would likely require treatment or offsite disposal to an appropriate landfill. Assuming that the oil depot area has however been remediated to a 'suitable for use' standard It is considered unlikely that additional remediation works will be required over and above the mitigation measures contained as standard in the draft CoCP.

Avoidance and mitigation measures

2.17.59 Risks to groundwater quality in the secondary A aquifer (River Terrace Deposits) from piling works to construct the HEx depot east connection trackwork will be managed in accordance with the draft CoCP (refer to Volume 5: Appendix CT-003-000 of the main ES) and good practice, including the Environment Agency guidance on piling and penetrative ground improvement. It is therefore expected that there will be a negligible effect on shallow groundwater quality within the River Terrace Deposits during construction[31] .

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

Permanent effects

Table 6: Summary of permanent (construction) effects

Area ref	Area name	Main baseline risk	Main construction risk	Post Construction effect and significance
HEx-01, HEx-02	Existing on-site railway land and Langley Station (AP2, Map LQ-01-HEx)	Moderate/low 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 on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases. Low potential impact to groundwater within the River Terrace Deposits (Secondary A bedrock aquifer). Low potential impact to surface water in the Horton Brook.	Very low Low Low Low	Negligible to minor beneficial (not significant)
HEx-08	Former on-site oil depot (AP2, Map LQ-01-HEx)	Moderate potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters. Low potential impact on human health off-site from contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust. Moderate/low potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases. Moderate/low potential impact to surface water in the Grand Union Canal. Moderate/low potential impact to groundwater within the River Terrace Deposits (Secondary A aquifer). Moderate/low potential impact to fabric of buildings and services (e.g. foundations, and water supply pipes).	Low Very low Moderate/low Low Low Very low	Negligible to moderate beneficial (significant)

Area ref	Area name	Main baseline risk	Main construction risk	Post Construction effect and significance
HEx-23, HEx-24	On-site historic landfills (AP2, Map LQ-01-HEx)	Moderate/low 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 to groundwater within the Secondary A superficial aquifer. Moderate potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Low Low Moderate/low	Negligible to minor beneficial (not significant)
HEx-22, HEx-25, HEx-26, HEx-27, HEx-28	Off-site historic landfills (AP2, Map LQ-01-HEx)	Moderate/low 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 to groundwater within the Secondary A superficial aquifer. Moderate potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Moderate/low Moderate/low Moderate	Negligible (not significant)
HEx-13, HEx-06, HEx-05, HEx-09, HEx-04, HEx-16, HEx-19	Former off-site concrete works, railway land, engineering works and other previous contaminative land uses. (AP2, Map LQ-01-HEx)	Low to moderate/low potential impact on human health on-site from contamination by direct contact, ingestion and inhalation of contaminants in soil and soil-derived dust and contaminated waters. Low to moderate/low potential impact to surface water in the Grand Union Canal. Moderate (railway land only) potential impact on on-site humans to contamination by inhalation of asphyxiative or explosive ground-gases.	Low to moderate/low Low to moderate/low Moderate	Negligible (not significant)

2.17.60 In Table 6 the magnitude of the permanent effects and their significance has been determined by calculating the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effects will therefore

result in a negligible significance, even if the risk is assessed to remain as high. This will be the case where the construction of the revised depot scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary.

2.17.61 Table 6 indicates that following remediation there will be, in most instances, an overall negligible to moderate beneficial effect on the areas of land identified as posing a contaminative risk within the area required to build the HEx depot.

2.17.62 Depending on the type of remediation undertaken, the beneficial effect recorded for certain sites is most likely to arise from the removal of contamination sources and direct contact, or dust pathways, by the construction of new hard surfaces (for example on the construction sites) and from the new station buildings or track bed materials .

2.17.63 There will be a negligible effect on all sites identified as posing a contaminative risk that are located outside of the area required to build the HEx depot.

Cumulative effects

2.17.64 There are no other committed developments that have been identified which will result in significant temporary or permanent cumulative effects.

Other mitigation measures

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

Summary of likely significant residual effects

2.17.66 With the application of the mitigation measures detailed above, there are likely to be no significant residual effects.

Effects arising during operation

2.17.67 Users of the HEx depot (i.e. depot workers), would be operating within a controlled environment at all times, and have therefore been scoped out of the assessment.

Avoidance and mitigation measures

2.17.68 Maintenance and operation of the HEx depot will be in accordance with environmental legislation and good practice. Where appropriate spillage and pollution response procedures will be established.

Assessment of impacts and effects

2.17.69 A Network Rail electricity substation will be constructed west of the proposed maintenance shed buildings. A substation can, in principle, be a source of contamination through accidental discharge. However, in common with other modern substations the use of a secondary containment will mitigate against this risk.

2.17.70 There will be the potential for minor leakage of hydraulic or lubricating oils from HEx trains. Any leakage or spillage is expected to be very small and would not lead to any significant contamination.

2.17.71 The risk assessment for the post-construction stage may specify measures set out in the draft CoCP and implemented during the construction phase to remove, treat or isolate contamination. Further measures could also include the construction of permanent embedded design features in buildings, such gas protection measures (e.g. ventilation of confined spaces or inclusion of gas resistant membranes in basement or floor slabs). Overall risks for future depot users from pre-existing contamination sources will be low to very low.

2.17.72 It is therefore considered that there will be no significant impacts to future depot users from pre-existing land contamination.

2.17.73 Overall, there will be no significant operational effects associated with land quality in the study area.

Other mitigation measures

2.17.74 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 HEx depot.

Summary of likely significant residual effects

2.17.75 No significant residual effects associated with the operation of the proposed HEx depot are likely to occur.

2.18 Landscape and visual assessment

Scope, assumptions and limitations

2.18.1 The assessment scope, key assumptions and limitations for landscape and visual assessment are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 -000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES. The study area was defined through a manual desktop analysis of the zone of theoretical visibility for the proposed HEx depot scheme. The extent of the visual envelope was then corroborated on site and the final study area determined.

2.18.2 The operational landscape and visual assessment refers to the presence of the new permanent infrastructure and trains associated with the depot.

2.18.3 Further details on the landscape and visual assessment baseline information are presented in SES and AP2 ES Volume 5: Landscape and Visual Appendix LV-001-HEx.

Baseline

Existing baseline

Landscape baseline

2.18.4 The settlement pattern within the wider Colne Valley is relatively sparse, although the valley is more densely developed to the south. The corridors of open space along the River Colne, Grand Union Canal and the lakes that these waterways support, are dominant landscape features in the valley bottom. There is concentrated residential and industrial development around Slough to the west. The GWML spans the Colne Valley and has a strong influence upon landscape character along its route. It either forms a boundary to urban development or passes directly through the settled area,

forming a green corridor due to adjacent line-side vegetation. The M25 corridor is a major urbanising feature within the landscape to the east of the area. Surrounding the major transport corridors are areas of industrial development and brownfield sites. Vegetation patterns include belts of woodland and scrub and areas of meadow within open spaces, lines of trees and shrubs along river corridors and railway lines and fields surrounded by hedgerows.

2.18.5 The landscape character areas (LCAs) have been defined through site survey and are based on the Buckinghamshire Landscape Character Assessment.

2.18.6 Descriptions of all LCA are provided in SES and AP2 ES Volume 5: Appendix LV-001-HEx Part 2. For the purposes of this assessment the study area has been sub-divided into three discrete LCA. The LCA are shown on map LV-02-HEx in the SES and AP2 ES Volume 4: Off-route Effects Map Book.

Iver Heath Mixed Use Terrace (south) LCA

2.18.7 The LCA is informed by the Iver Heath Mixed Use Terrace LCA as described in the South Bucks District Landscape Character Assessment[32]. For the purposes of assessing the effects of the AP, this character area has been subdivided to reflect the local variation in landscape character. To the north, the LCA consists of a more harmonious landscape with small to medium-sized arable field usually bordered by hedgerows and trees, whereas to the south, the field pattern reflects larger, open arable fields with occasional hedgerows and trees and a greater prominence of infrastructure and settlements. The proposed HEx depot would be located within this southern area.

2.18.8 The Iver Heath mixed use terrace (south) LCA occupies a transitional lowland area gradually rising from the floodplain in the east and south towards the north. Land use is mixed and highly influenced by development and settlements. The managed and maintained elements within the LCA, largely related to agriculture and golf courses, are assessed as being in fair condition.

2.18.9 The main settlements within the LCA are Richings Park and Iver. This landscape is divided by numerous rural roads and dissected by the GWML and the Grand Union Canal which run east to west. The M25 is audible and visible, although located to the east outside of the LCA. Two long distance footpaths cut through the area; Beeches Way and the Grand Union Canal Walk. The varied land use, and dominance of manmade features, creates a visually discordant landscape, with the GWML and Grand Union Canal creating physical barriers through the centre of the LCA. Due to the presence of these infrastructure elements in a rural setting, the overall level of tranquillity is considered to be medium. The LCA is located within areas of green belt and the Colne Valley Regional Park. These factors contribute to make this a regionally valued landscape. Overall, this area has a medium sensitivity to change.

Visual baseline

2.18.10 Descriptions of the identified representative viewpoints are provided in Volume 5 Appendix LV-001-001, Part 2. The viewpoints are numbered to identify their locations

[32] http://www.buckscc.gov.uk/environment/heritage-ecology/landscape/buckinghamshire-landscape-character-assessment/south-bucks-district-landscape-character-assessment/

which are shown in Map LV-03-HEx and LV-04-HEx in the SES and AP2 ES Volume 4: Off-route Effects Map Book. In each case, the middle number (xxx.**x**.xxx) identifies the type of receptor that is present in this area:

- 1: protected views;
- 2: residential;
- 3: recreational;
- 4: transport; and
- 6: employment.

2.18.11 No protected views have been identified within the study area.

2.18.12 Residential receptors have a high sensitivity to change and consist predominantly of properties on the fringe of settlements to the north and south of the proposed HEx depot scheme. Views within the study area are typically semi-rural across agricultural fields with occasional industrial buildings, electricity pylons and infrastructure associated with the GWML visible in the background. Vegetation along the edge of settlements, which is particularly dense along the Richings Park residential area, limits views from residential properties in conjunction with the vegetation bordering the Grand Union Canal.

2.18.13 Recreational receptors, also with a high sensitivity to change, are located on PRoW across the study area and include boat users on the Grand Union Canal. The viewpoints are typically located in agricultural locations, with arable fields forming the foreground, with the exception of viewpoints from the PRoW running along the Grand Union Canal. The views extend towards the transport corridors of the Grand Union Canal and GWML, where vegetation bordering these elements limits any views beyond.

2.18.14 Drivers and those travelling on the roads through the study area, such as Hollow Hill Lane generally have a low sensitivity to change due to the busy nature of the roads, the urban fringe location and limited pedestrian use.

2.18.15 Employment receptors have a low sensitivity to change. Commercial users are more prevalent on Thorney Lane and off the B470, Station Road. Views are generally limited by vegetation enclosing the industrial and commercial areas.

Future baseline

Construction (2017)

2.18.16 The construction of Crossrail will still be taking place in 2017, with works including development at Langley Station to the west of the study area, which will include overhead line equipment construction. These developments are shown on map CT-13-HEx and CT-18-HEx in SES and AP2 ES Volume 4: Off-route Effects Map Book). These developments are unlikely to alter the character of the LCA, as they will be of a similar type and comparable scale to those that exist within the LCA and they would be largely characteristic of their setting. Overall, there would be no change to the overall sensitivity of the LCA.

2.18.17 New visual receptors will arise from the completion of committed developments within the proximity of Langley Station. However, these would be in an area where representative visual receptors have already been identified.

Operation (2020)

2.18.18 The new overhead line equipment, sidings and depot for Crossrail will be constructed and in use by 2020. These are largely characteristic of the setting and would not change the overall sensitivity of the LCA.

2.18.19 The new Crossrail depot would partly screen the view from viewpoint HEx.6.008: View north from Langley Business Centre. New receptors would arise from the committed development. However, these would be in an area where representative visual receptors have already been identified and would not be significantly affected during operation.

Effects arising during construction

2.18.20 The construction works that have been taken into account in determining the effects on landscape character and views across the HEx Depot at Langley study area include:

- advanced works including site investigations, preliminary mitigation works and preliminary enabling works;
- civil engineering works including establishment of site compound, site preparation and enabling works, earthworks, main structure works, site restoration and removal of site compound;
- railway installation works including establishment of site compound, infrastructure installation, connections to utilities, changes to the existing rail network, and removal of site compounds; and
- system testing and commissioning.

Landscape assessment

2.18.21 The following section describes the likely significant effects on LCAs during construction. All LCAs within the study area considered to experience an effect that will not be significant (minor or negligible) are described in SES and AP2 ES Volume 5: Landscape and Visual Assessment Appendix LV-001-HEx Part 3.

Iver Heath Mixed Use Terrace (south) LCA

2.18.22 The proposed HEx depot scheme will be located within the central section of the LCA between the Grand Union Canal and the GWML. Construction activities associated with the proposed HEx depot scheme will include the realignment and lowering of the Hollow Hill Lane underbridge, the construction of the HEx depot west connection, HEx depot east connection, plant room and train wash unit and replacement floodplain storage area. Site compounds will also be introduced into the LCA including; Hollow Hill Lane underbridge satellite compound and Hollow Hill Lane main compound.

2.18.23 The construction works will result in the loss of vegetation and agricultural land and the introduction of construction activity, construction plant and new temporary

structures within Hollow Hill Lane underbridge satellite compound, Hollow Hill Lane main compound and the HEx depot east connection satellite compound within the LCA. The construction of the Hollow Hill Lane underbridge, together with the construction of cutting, embankments and temporary earthworks will introduce large plant and cranes (30m in height).

2.18.24 The construction of the Hollow Hill Lane underbridge will result in the loss of vegetation in the western part of the LCA, increasing the openness of the landscape. Similarly, adjacent to the GWML, there will be a loss of vegetation resulting from the construction of the HEx depot east connection. The earthworks and temporary stockpiles of construction materials associated with the HEx depot east connection and Hollow Hill Lane main compound will alter the structure of the generally flat and partially enclosed part of the LCA. The remainder of the LCA both north and south of this section will not be noticeably affected by the construction works other than emphasising the 'infrastructure corridor' running east-west through the LCA.

2.18.25 The works will introduce vehicles and construction activity into an urban fringe location, which will reduce tranquillity locally.

2.18.26 Construction activities will result in the loss of agricultural land and mature vegetation and the presence of construction plant and activity will alter the setting of the LCA by further dividing the north and south sections of the LCA. However, these changes will be localised within the context of the wider LCA. The construction of the scheme will introduce prominent new elements into the LCA that are largely characteristic of the existing setting. When changes are considered in the context of the overall LCA, the magnitude of change will be medium.

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

Visual assessment

2.18.28 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, will be in leaf. Where residential receptors experience significant 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 SES and AP2 ES Volume 5: Landscape and Visual Assessment Appendix LV-001-HEx Part 4.

2.18.29 The number identifies the viewpoint locations which are shown on maps LV-03-HEx in Volume 4: Off-route Effects Map Book. In each case, the middle number (xxx.**x**.xxx) identifies the type of receptor that is present in this area:

- 1: protected views;
- 2: residential;
- 3: recreational;
- 4: transport; and

- 5: employment.

2.18.30 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity would be lower than those reported.

Viewpoint HEx.3.004: View from Public Right of Way - IVE/15/1 looking north-west

2.18.31 During the construction phase, activities associated with the construction of HEx depot east connection will be evident in the view. The earthworks, together with the loss of some trees to the north of the GWML and the Hollow Hill Lane main compound will all be visible. In the background of the view, the construction of the Hollow Hill underbridge will be visible together with glimpses of the earthworks and construction of the maintenance shed. Infrastructure and vegetation associated with the GWML in the middle ground, will also be visible. Overall, this construction activity will represent a noticeable change in the view. However, this will be partially filtered by intervening vegetation and the GWML. Therefore, the magnitude of change will be medium.

2.18.32 The medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

Viewpoint HEx.2.006: View north-east from Market Lane

2.18.33 The proposed HEx depot scheme will lie approximately 250m from this viewpoint. Construction of the Hollow Hill Lane underbridge, the lowering of Hollow Hill Lane and the Hollow Hill Lane main compound will be visible in the view to the right of the Hollow Hill Lane bridge. However, views will be partially screened by the presence of the GWML embankment in the foreground and filtered by existing vegetation to the south of the embankment. In the middle ground of the view, beyond the railway embankment, the earthworks required during the construction of the HEx depot east connection will be screened by the existing GWML. The introduction of construction plant and construction activity will form one of a series of components in the middle ground of the view, which looks towards arable fields and the GWML railway corridor. Therefore, the magnitude of change will be medium.

2.18.34 The medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

Viewpoint HEx.2.007: View north from Mead Avenue and Maplin Park

2.18.35 The proposed HEx depot scheme will be approximately 50m from the three and two storey properties represented by this viewpoint. Construction works potentially visible from this viewpoint will include the raising in height of the site by up to 3m, the construction of the proposed HEx depot, an electrical substation, maintenance shed and associated offices. Construction activities relate to the introduction of the plant room and train wash unit and the construction of the HEx depot west connection and associated earthworks. The introduction of construction plant including cranes and piling rigs will be visible in close proximity to this viewpoint. However, views will be filtered by vegetation running alongside the GWML railway corridor and therefore, the magnitude of change will be medium.

2.18.36 The medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

Viewpoint HEx.2.010: View south from house boats moored on the Grand Union Canal and the Grand Union Canal Walk (towpath)

2.18.37 This viewpoint is located adjacent to the proposed HEx depot scheme. In the foreground the construction of the replacement floodplain storage area, loss of existing trees and the Hollow Hill Lane underbridge satellite compound will be partially visible through the retained canal side vegetation. Further west, along the towpath, the HEx depot satellite compound and temporary material stockpile will be closest to the viewpoint with the offices and maintenance shed located in the middle ground of the view. However, the existing vegetation will partially screen construction activity however, taller built elements and equipment will be visible above the intervening vegetation. The overall magnitude of change will be medium.

2.18.38 The medium magnitude of change, assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

Viewpoint HEx.4.0012: View west from Hollow Hill Lane

2.18.39 The construction works will be clearly visible in the foreground and middle ground of the view emphasised through the loss of existing trees and scrub due to construction works. Raising the site ground level by up to 3m, the track and sidings construction, the plant room and train wash unit will be prominent in the foreground. In the background of the view the construction of the proposed HEx depot, maintenance shed and offices will also be visible. These construction works will result in a major alteration to key characteristics of the view of arable fields against a backdrop of woodland. The magnitude of change will be high.

2.18.40 The high magnitude of change, assessed alongside the low sensitivity of the receptor will result in a moderate adverse effect, which is significant.

Cumulative effects

2.18.41 Section 2.1 and SES and AP2 ES Volume 5: Appendix CT-004-000, identify developments with planning permission or sites allocated in adopted development plans, on or close to the proposed HEx depot. These are termed 'committed developments' and will form part of the baseline for the construction of the proposed HEx depot.

2.18.42 There are no known developments which are assumed to be under construction at the same time as the proposed HEx depot scheme which will result in a consequential cumulative effect on LCAs or viewpoints.

Other mitigation measures

2.18.43 No other mitigation measures are considered practicable during construction.

Summary of likely residual significant effects

2.18.44 As no other mitigation measures are considered practicable, the temporary residual significant effects during construction will remain as described in this section. 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 presence of construction activity and construction plant within the

landscape and viewed from surrounding residential receptors, PRoW, users of the Grand Union Canal and main roads within the study area.

Effects arising from operation

2.18.45 The specific elements of the proposed HEx depot scheme that have been taken into account in determining the effects on landscape and visual receptors include:

- increased train presence;
- a 12m high maintenance shed with maintenance/stabling sidings, office, staff welfare facilities and storage;
- eight maintenance/stabling sidings with CET facilities;
- a carriage delivery siding (to be used for unloading train carriages from lorries onto the railway);
- a 250m turn back siding;
- a car park;
- new trackwork connecting the depot to the GWML;
- access road within the depot boundary;
- alterations to overhead line equipment on the GWML and depot operation signalling;
- plant room and train wash unit;
- realignment and lowering of a section of Hollow Hill Lane;
- replacement floodplain storage area;
- an electrical substation; and
- night-time flood lighting with towers up to approximately 7m in height.

Avoidance and mitigation measures

2.18.46 Mitigation measures are illustrated on maps CT-06-154 and CT-06-155 in the SES and AP2 ES Volume 4: Off-route Effects Map Book.

2.18.47 Planting will be introduced to the east of Hollow Hill Lane along the HEx depot east connection, which together with the retention of existing planting along the southern boundary of the Grand Union Canal towpath will assist in screening infrastructure and will reinforce and strengthen the existing landscape structure.

2.18.48 Hedgerow and tree planting is proposed along Hollow Hill Lane to enhance the setting and integrate the realigned road into the landscape.

2.18.49 To the west of Hollow Hill Lane, woodland habitat planting is proposed between the GWML and the HEx depot west connection, which will assist in screening new elements within the landscape and strengthen the landscape structure. To the north of the HEx depot west connection, areas of wet woodland planting are proposed to

break up the view across the replacement floodplain storage area towards the proposed HEx depot.

2.18.50 To the north of the HEx depot maintenance shed and offices, woodland habitat planting is proposed which will assist in screening the new buildings and reinforce the existing landscape structure.

2.18.51 Along the canal side, existing trees will be retained and the tree line strengthened with planting to fill in any gaps.

2.18.52 To reduce and mitigate the effects of lighting, consideration of where lighting can be positioned will be given during the detailed design stage to minimise and control light pollution.

Assessment of impacts and effects

Landscape assessment

2.18.53 This section describes the significant effects on LCAs during year 1, year 15 and year 60 of operation. Effects that will not be significant for LCAs are presented in the SES and AP2 ES Volume 5: Landscape and Visual Assessment Appendix LV-001-HEx Part 3.

Iver Heath Mixed Use Terrace (south) LCA

2.18.54 The proposed HEx depot scheme will be located within the central section of the LCA between the Grand Union Canal and the GWML, affecting only a small proportion of the overall LCA. Landscape impacts of the proposed HEx depot scheme will include:

- engineered landforms associated with the HEx depot east connection to the GWML;
- engineered landforms associated with the HEx depot west connection to the GWML;
- presence of overhead line equipment;
- introduction of the plant room and train wash unit;
- the realigned Hollow Hill Lane and railway underbridge; and
- the majority of the replacement floodplain storage area.

2.18.55 There will be a small reduction in tranquillity within the LCA resulting from the increase in the number of trains and maintenance activity in a semi-rural context. In addition, the introduction of new elements into the LCA, in particular the HEx depot East and West connections to the GWML and overhead line equipment, will emphasise the presence of an infrastructure 'corridor' which fragments the LCA. This will include the proposed HEx depot infrastructure as well as the existing GWML, the Grand Union Canal and overhead electricity lines. The HEx depot east connection, plant room and train wash unit will be more evident within the landscape with the loss of existing vegetation during construction. However, this will be mitigated over time with the introduction of new planting to screen infrastructure and reinforce the existing landscape structure.

2.18.56 Overall, the scheme will introduce new features that form prominent elements within the LCA, however these are largely characteristic of the existing setting. This results in a medium magnitude of change in year 1 of operation, as the mitigation planting will not be established. The medium magnitude of change, assessed alongside the medium sensitivity of the LCA will result in a moderate adverse effect, which is significant.

2.18.57 By year 15 of operation, the mitigation planting will have matured sufficiently to provide screening and reinforce the existing landscape structure reducing the magnitude of change to low. The low magnitude of change, assessed alongside the medium sensitivity of the LCA will result in a minor adverse effect, which is not significant.

2.18.58 By year 60 of operation, the further growth and maturity of the proposed planting will provide greater screening and integration of the proposed HEx depot scheme in the landscape. The low magnitude of change, assessed alongside the medium sensitivity of the character area will result in a minor adverse effect, which is not significant.

Visual assessment

2.18.59 This section describes the significant effects on visual receptors during year 1, year 15 and year 60 of operation. Effects that will not be significant on visual receptors are presented in SES and AP2 ES Volume 5: Appendix LV-001-HEx Part 4.

2.18.60 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.

2.18.61 The number identifies the viewpoint locations which are shown on maps LV-04-HEx in SES and AP2 ES Volume 5: Landscape and Visual Map Book. In each case, the middle number (xxx.**x**.xxx) identifies the type of receptor that is present in this area:

- 2: residential;
- 3: recreational; and
- 4: transport.

2.18.62 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 HEx.3.004: View from Public Right of Way - IVE/15/1 looking north-west

2.18.63 The HEx depot east connection and associated earthworks and overhead line equipment will be evident in the middle ground of the view, approximately 350m away. The connection will be in cutting and partially screened from view. The realigned Hollow Hill Lane and Hollow Hill Lane underbridge will be visible beyond. In the background, there will be distant views of the proposed HEx depot maintenance

shed and offices, approximately 1.3km away. The proposed HEx depot scheme will be viewed as a series of components in the middle ground of the view. Overall, the magnitude of change will be medium.

2.18.64 The medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect in winter of year one of operation, which is significant. In summer, the existing vegetation along the GWML will provide additional screening however, this is intermittent and the overall predicted effects will remain unchanged. The mitigation measures of additional planting will not provide additional screening from the south.

2.18.65 In year 15 of operation the predicted impacts will remain unchanged. Therefore, the medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

2.18.66 Similarly, in year 60 of operation the predicted impacts will remain unchanged. Therefore, the medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

Viewpoint HEx.2.007: View north from Mead Avenue and Maplin Park

2.18.67 In the foreground, there will be filtered views of the proposed HEx depot maintenance shed and offices, together with associated overhead line equipment and lighting, through the railway-side vegetation, from the neighbouring residential properties. The introduction of the approximately 12m high maintenance shed and associated approximately 7m high depot lighting towers will be visible from the upper floors of the properties over the GWML embankment. Views from the lower floors will be largely screened. The new features will be highly visible but are largely characteristic if the existing view in the context of the adjacent Canal Wharf Industrial Estate and brown field site. The presence of the plant room and train wash facilities will be more incongruous with the previously verdant outlook for properties off Maplin Park. The overall magnitude of change will be medium.

2.18.68 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, which is significant. In summer, the existing vegetation along the GWML embankment will provide additional screening but this is intermittent and the overall predicted effects will remain unchanged. The mitigation measures of additional planting will not provide additional screening from the south in year 1.

2.18.69 In year 15 of operation the predicted effects will remain unchanged. Therefore, the medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

2.18.70 Similarly, in year 60 of operation the predicted impacts will remain unchanged. Therefore, the medium magnitude of change assessed alongside the high sensitivity of the receptor will result in a moderate adverse effect, which is significant.

2.18.71 At night, the use of additional lighting associated with the HEx depot will be viewed in the context of the existing street lighting and lighting associated with Langley Station and adjacent Canal Wharf Industrial Estate. Direct views north from the upper floors of the properties will be over the currently unlit land and therefore the floodlighting positioned on 7m lighting towers has the potential to be visually intrusive, however

this is dependent on location and proposed luminaire type. Without further detail on the design, it has been assumed that the presence of 24 hour lighting will result in a medium magnitude of change to this receptor at night resulting in a moderate adverse effect, which is significant.

Viewpoint HEx.4.012: View west from Hollow Hill Lane

2.18.72 In the foreground, the view will be open across the floodplain storage area, adjacent to the viewpoint. Beyond the floodplain storage area, the railway tracks on embankment will be seen in the middle ground of the view. To the south, in the middle ground of the view, the plant room, trainwash unit and associated lighting will be visible. In the background of the view, the maintenance shed, offices and sidings, together with depot lighting columns will form the backdrop to the west. The proposed HEx depot scheme will represent substantial changes to the existing view therefore, the magnitude of change will be high.

2.18.73 The high magnitude of change assessed alongside the low sensitivity of the receptor will result in a moderate adverse and therefore, a significant effect in the winter of year 1 of operation. In summer of year 1, predicted effects will remain unchanged as the proposed mitigation planting will not be established sufficiently to provide additional screening.

2.18.74 In year 15 of operation, although proposed mitigation planting will have matured, providing some screening, elements of the proposed HEx depot scheme will remain visible, resulting in a medium magnitude of change, which assessed alongside the low sensitivity of the receptor will give rise to a minor adverse effect. This is not significant.

2.18.75 By year 60 of operation, the additional planting mitigation will have matured providing greater screening of the proposed HEx depot scheme, reducing the magnitude of change to low, which assessed alongside the low sensitivity of the receptor will give rise to a minor adverse effect. This is not significant.

Cumulative effects

2.18.76 There are no known cumulative developments which are assumed to be completed by year 1 of operation of the proposed HEx depot scheme which will result in consequential cumulative effect on LCAs or viewpoints.

Other mitigation measures

2.18.77 Other mitigation measures to further reduce the significant effects described above will be considered during the detailed design stage, including consideration of where planting can be established early in the construction programme, rendering for the building elements and directional lighting. However, not all landscape and visual effects can be practicably mitigated due to the visibility of operation activity and the sensitivity of surrounding receptors. No other mitigation measures are considered practicable during construction.

Summary of likely significant residual effects

2.18.78 Where new or replacement planting is proposed, significant effects will reduce over time as proposed mitigation planting matures and reaches its designed intention.

However, the following significant residual effects will remain following year 15 of operation:

- The large-scale maintenance shed, offices and storage and associated lighting will remain highly visible features in the views from HEx.3.004: View from Public Right of Way - IVE/15/1 looking north-west and HEx.2.007: View north from Mead Avenue and Maplin Park.

2.19 Socio-economics

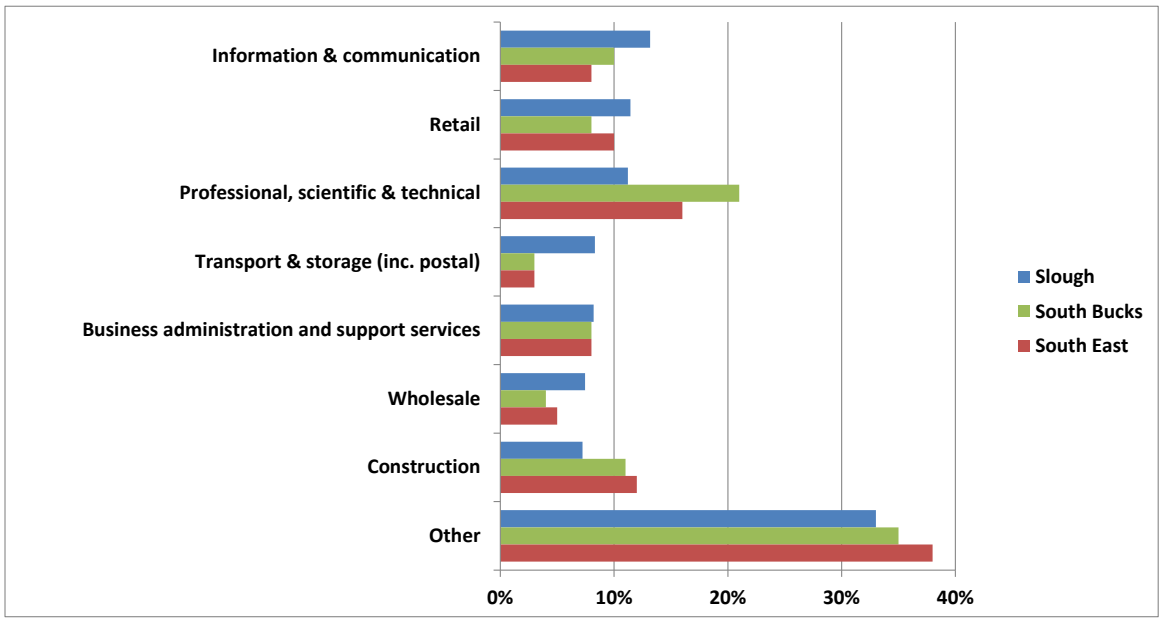
Scope, assumptions and limitations

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

Baseline

2.19.2 In the Slough Borough Council area, the information and communication sector accounts for the largest (13%) proportion of businesses, whilst professional, scientific and technical services (11%) and retail (11%) are also important sectors. The professional, scientific and technical services sector accounts for the largest (21%) proportion of businesses within South Buckinghamshire, whilst construction (11%) and information and communication (10%) are also important sectors. This is shown below in Figure 6. For comparison, within the South East, the professional, scientific and technical services sector accounts for the largest number of businesses (16%) with construction (12%) also accounting for a high proportion of firms. The retail sector accounts for 10% of businesses at the regional level making it the third largest sector and of comparable size to Slough where it also accounts for 10% of businesses.

Figure 6: Business sector composition in Slough, South Buckinghamshire and the South East[33][34]

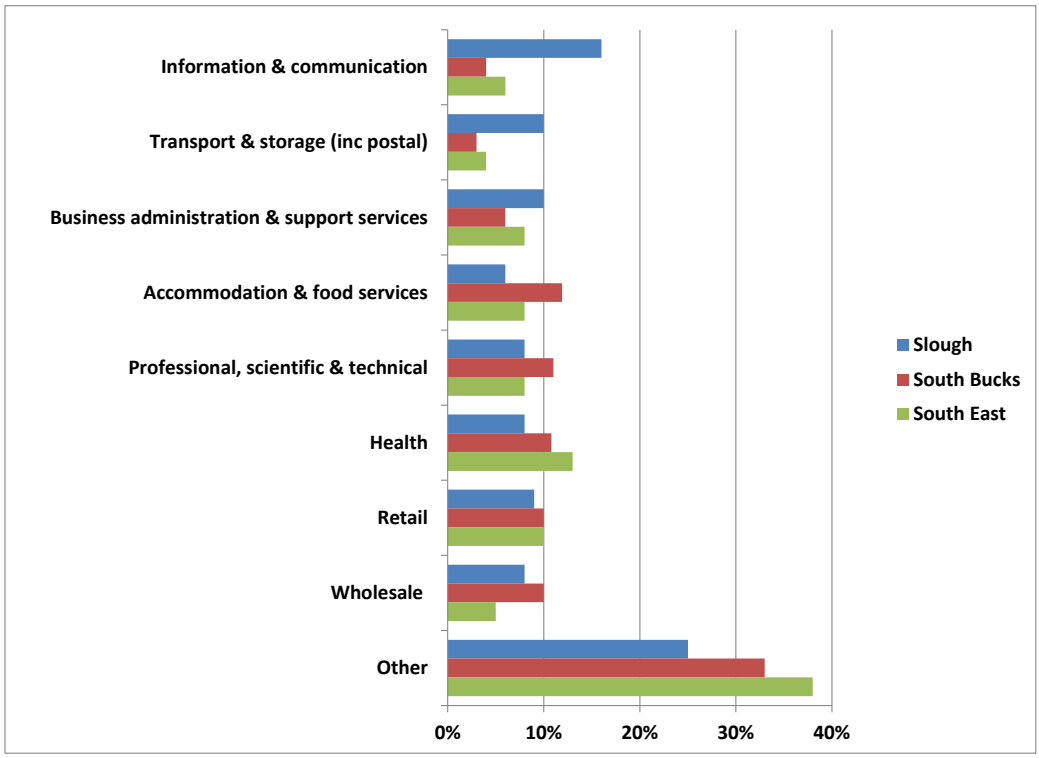


[33] 'Other' includes production, property, arts, entertainment, recreation and other services, accommodation and food services, public administration and defence, agriculture, forestry and fishing, finance and insurance, education, motor trades and health
[34] Office of National Statistics (ONS) (2012), UK Business: Activity, Size and Location 2012, ONS, London

2.19.3 Approximately 79,000 people worked in Slough and 31,000 in South Buckinghamshire in 2011.

2.19.4 According to the Office for National Statistics (ONS) Business Register and Employment Survey 2011, the sector with the highest proportion of employment in Slough is information and communication at 16%, with this sector accounting for 6% in the South East. The transport and storage sector also accounts for a high proportion of employment in the borough at 10%, which is considerably more than the 4% it accounts for at the regional level. The business administration and support services sector is the third largest sector in Slough by employment, accounting for 10% of jobs, and is moderately higher than the figure recorded for the South East as a whole of 8%. The sector with the highest proportion of employment in South Buckinghamshire is accommodation and food services with 12% of jobs, compared to 8% in the South East and 7% in England. The professional, scientific and technical sector is also important in South Buckinghamshire accounting for 11% of jobs compared to 8% regionally, with the health sector also accounting for a high proportion of jobs at 11% compared to 13% for the South East. This is shown in Figure 7.

Figure 7: Employment by industrial sector in Slough, South Buckinghamshire and the South East[35][36]



2.19.5 According to the 2011 census 37, the employment rate38 within Slough in 2011 was 71% (which represents 68,000 people) 69% for South Buckinghamshire (which represents 33,000 people), both being higher than the 68% recorded for the South East and 65% for England as a whole.

[35] 'Other' includes agriculture, forestry, and fishing, mining, quarrying and utilities, public administration and defence, finance and insurance, motor trades, property, construction, and accommodation and food services.
[36] ONS (2011), Business Register and Employment Survey 2011, ONS, London
[37] ONS (2011), Census 2011, London
[38] The proportion of working age (16-74 years) residents in employment. Employment comprises the proportion of the total resident population who are 'in employment' and includes full-time students who are employed.

2.19.6 The unemployment rate for Slough in the 2011 census stood at 5% and 4% in South Buckinghamshire, which were lower than the England average of 7%.

2.19.7 According to the 2011 census, 29% of Slough residents aged 16 and over were qualified to National Vocational Qualification Level 4 with 37% of residents in South Bucks being qualified to that level, compared to 30% in the South East region and 27% for England. Residents with no qualification stood at 20% for the Slough and 17% in South Buckinghamshire, compared to 19% regionally.

2.19.8 Slough is predominantly an urban area, recording high rates of employment, a low rate of unemployment and has a slightly less qualified workforce than regionally and nationally. In contrast South Bucks District is made up of typically residential areas set within a mostly rural environment, which similarly recorded a high rate of employment and low unemployment, albeit with a higher level of qualifications compared to Slough and the South East.

Future baseline

Construction (2017)

2.19.9 There are no consents or allocations which are assumed to have been implemented by 2017 that have a material effect on socio-economics.

Operation (2020)

2.19.10 There are no consents or allocations which are assumed to have been implemented by 2020 that have a material effect on socio-economics.

Effects arising during construction

Avoidance and mitigation measures

2.19.11 In order to avoid or minimise the environmental impacts during construction, the proposed HEx depot design includes provisions to maintain access to businesses during the construction phase.

2.19.12 The draft CoCP (Volume 5: Appendix CT-003-000) includes a range of provisions that will help mitigate 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 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);
- contractors will be required to monitor and manage flood risk and other extreme weather events which may affect socioeconomic 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

2.19.13 The amendment includes land required by the scheme which will require the demolition of a concrete batching plant lying within a larger business operation engaged in the processing of aggregates within Thorney Lane Business Park. Although this amendment will potentially result in the displacement or possible loss of employment, the effect of the amendment on this socio-economic resource and their employees is assessed overall to be minor adverse and is therefore not significant.

2.19.14 It is estimated that the amendment would result in the displacement or possible loss of a total of 50 jobs. The impact on the local economy from the loss/relocation of jobs is considered to be relatively minor compared to the scale of economic activity and opportunity in the area.

Other mitigation measures

2.19.15 There are no other mitigation measures required during construction.

Cumulative effects

2.19.16 No significant cumulative construction socio-economic effects of relevance to this amendment.

Summary of likely residual significant effects

2.19.17 There are no residual significant socio-economic effects of relevance to this amendment.

Effects arising from operation

Avoidance and mitigation measures

2.19.18 No mitigation measures of relevance to this amendment are considered to be required during operation within this area.

Assessment of impacts and effects

2.19.19 There are no significant socio-economic effects of relevance to this amendment.

Other mitigation measures

2.19.20 There are no other mitigation measures required during operation.

Cumulative effects

2.19.21 There are no significant cumulative operation socio-economic effects of relevance to this amendment.

Summary of likely residual significant effects

2.19.22 There are no residual significant socio-economic effects of relevance to this amendment.

2.20 Sound, noise and vibration

Scope, assumptions and limitations

2.20.1 The assessment has considered the likely noise and vibration significant effects arising from the construction and operation of the HEx depot at Langley 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[39]; 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'[40].

2.20.2 In this assessment 'sound' is used to describe the acoustic conditions which people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of community areas is likely to be modified through the introduction of the proposed HEx depot. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

2.20.3 Effects can either be temporary from construction or permanent from the operation of the proposed HEx depot. These effects may be direct, resulting from the construction or operation of the proposed HEx depot, and/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 HEx depot.

2.20.4 This section also sets out the means to avoid or reduce the adverse effects that may occur.

2.20.5 The assessment scope, key assumptions and limitations for sound, noise and vibration are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 -000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES and in SES and AP2 ES Volume 5: Sound, Noise and Vibration Appendix SV-004-027.

2.20.6 The assessment of likely significant effects from noise and vibration on agricultural, community, ecological or heritage receptors and the assessment of tranquillity are presented in Sections 2.12, 2.14, 2.15, 2.16 and 2.18 of this report respectively.

2.20.7 More detailed information and mapping regarding the sound, noise and vibration assessment for the proposed HEx depot is available as follows:

- sound, noise and vibration, route-wide assumptions and methodology (main ES, Volume 5: Appendix SV-001-000);
- sound, noise and vibration baseline (SES and AP2 ES, Volume 5: Sound Noise and Vibration Appendix SV-002-027);

[39] '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.

[40] 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 on tranquillity is provided in Section 9) .

- sound, noise and vibration construction assessment (SES and AP2 ES, Volume 5: Sound Noise and Vibration Appendix SV-003-027);
- sound, noise and vibration operation assessment (SES and AP2 ES, Volume 5: Sound Noise and Vibration Appendix SV-004-027; and
- maps SV-03 and SV-04 (SES and AP2 ES Volume 5: Sound, Noise and Vibration Map book).

Local assumptions and limitations

Construction

2.20.8 Activities associated with night time possession works including earth works on railway land 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.

2.20.9 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.

2.20.10 Although it is anticipated that there may be some night-time working during works to cross or tie into existing roads and railways, it is assumed that the noise effects would be limited in duration and are unlikely to be considered significant. Any noise effects arising from these short term construction activities will be controlled and reduced by the management processes set out in the draft CoCP.

2.20.11 Dwellings in the Mansion Lane and Dudley Wharf Caravan Sites at Hollow Hill Lane, Langley and the moorings for canal boats on the Grand Union Canal are assumed to be occupied as permanent dwellings and the noise insulation and temporary re-housing policy developed according to the draft COCP will contain measures to reduce noise inside all dwellings such that it does not reach a level where it will significantly affect residents.

2.20.12 In this area, sufficient information has been obtained to undertake the assessment. Further information is set out in Volume 5: Appendix SV-003-027.

Operation

2.20.13 The HEx depot will operate throughout the day and night, but with the majority of operations occurring during the night. Night-time operations that generate noise will be reduced to a practical minimum. Passenger trains will be prepared and dispatched from approximately 05:00. Trains will return to the proposed HEx depot during the evening as passenger services decrease on the operational railway, with the last train expected to arrive back from service at approximately 00:30. Trains will arrive at the proposed HEx depot during the night for routine inspections and maintenance. Trains will undergo planned maintenance (generally inside maintenance sheds) during the daytime. Trains requiring urgent, unplanned maintenance identified by that night's inspection will be undertaken overnight, if necessary.

2.20.14 The effects of noise and vibration from the operation of the HEx depot have been assessed based on the likely train flows into and out of the depot. Train speeds and flows are shown in Table 7.

Table 7: Train flows and speeds

Description of line	Time period for peak daytime flows	Number of trains per hour in each direction	Speed
Great western main line to HEx depot	22:00 – 01:00 and 05:00 – 07:00	5 trains per hour entering the depot between 22:00 and 01:00 and five trains per hour leaving the depot between 05:00 and 07:00	8 km/h within the depot confines

Baseline

Existing baseline

2.20.15 The existing baseline sound environment in this area is comprised road traffic, railway and industrial noise.

2.20.16 The sound environment at the majority of receptors in close proximity to the proposed HEx depot site, such as Bathurst Walk, Mead Avenue, Maplin Park, Southwold Spur, Alderbury Road, canal boats on the Grand Union Canal and the caravan site located on Mansion Lane, is dominated by the sounds from local railways and distant road traffic on the M25. There is also some local road traffic from surrounding roads and intermittent sounds from aircraft. Railway sound levels are lower at properties further from the railway and road traffic is more noticeable.

2.20.17 Daytime sound levels are generally around 55 to 60dB but can increase by 10dB or so when in close proximity to transportation sound sources such as the existing GWML railway. Train horns are audible at locations in close proximity to the railway line.

2.20.18 Night-time sound levels in this area are generally around 5 dB lower than daytime and the sound environment at this time consists of similar sources as the day such as rail and road traffic.

2.20.19 Further information on the existing baseline, including baseline sound levels and baseline monitoring results, is provided for this area in SES and AP2 ES Volume 5: Sound Noise and Vibration Appendix SV-002-027.

2.20.20 It is likely that the majority of receptors adjacent to the proposed HEx depot are not currently subject to appreciable vibration[41]. Vibration at all receptors arising from the proposed HEx depot has therefore been assessed using specific thresholds, below which receptors will not be affected by vibration. Further information is provided in main ES Volume 1, Section 8.

Future baseline

2.20.21 Without the proposed HEx depot, 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[42], tyre sound dominates and hence the expected growth in traffic is likely to continue to increase ambient sound levels.

[41] Further information is available in the Volume 5: Appendix SV-001-000, the SMR and its Addendum.

[42] Tyre noise typically becomes the dominant sound source for steady road traffic at speeds above approximately 30mph

Construction (2017)

2.20.22 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 the SES and AP2 Volume 5: HEx depot Traffic and Transport assessment.

Operation (2020)

2.20.23 The assessment is based upon the predicted change in sound levels that result from the proposed HEx depot. 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 2015.

Effects arising during construction

Avoidance and mitigation measures

2.20.24 The assessment assumes the implementation of the principles and management processes set out in the draft CoCP. 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 will be applied in the following order:

- noise and vibration control at source: for example the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings; and
- screening: for example local screening of equipment or perimeter hoarding.

2.20.25 Where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary rehousing, will be offered in accordance with the noise insulation and temporary rehousing policy defined within the draft CoCP.

2.20.26 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 rehousing provision.

2.20.27 Contractors will undertake and report such monitoring as is necessary to ensure 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.

2.20.28 Contractors will be required to comply with the terms of the CoCP and appropriate action will be taken by the Nominated Undertaker as required to ensure compliance.

2.20.29 In addition to this mitigation, taller screening as described in the draft CoCP has been assumed along edge of the construction site boundary adjacent to the residential communities at the proposed HEx depot.

Assessment of impacts and effects

2.20.30 More detailed information regarding the construction sound, noise and vibration assessment for the proposed HEx depot is available in appendix Volume 5: Sound, noise and vibration construction assessment (SES and AP2 ES Appendix SV-003-027).

Residential receptors: direct effects - individual dwellings

2.20.31 Taking account of the avoidance and mitigation measures, approximately 60 residential buildings (approximately 162 dwellings) are forecast to experience noise levels higher than the noise insulation trigger levels as defined in the draft CoCP during the night-time. For daytime construction the trigger level is 75dB measured outdoors, or the existing ambient if this is already above this level. The equivalent evening and night-time trigger levels are 65dB and 55dB respectively. The buildings previously referred to in this paragraph are as follows:

- 15 buildings (24 dwellings) on Southwold Spur, Langley;
- 13 buildings (46 dwellings) in Mead Avenue, Langley;
- 7 buildings (67 dwellings) in Maplin Park, Langley; and
- 25 buildings (25 dwellings) in the Mansion Lane and Dudley Wharf Caravan Sites at Hollow Hill Lane, Langley and at the moorings for canal boats on the Grand Union Canal in the vicinity of Hollow Hill Lane, Langley.

2.20.32 The mitigation measures, including noise insulation, will reduce noise inside all dwellings such that it does not reach a level where it will significantly affect residents.

Residential receptors: direct effects - communities

2.20.33 With regard to noise outside dwellings, the assessment of temporary effects takes account of construction noise relative to existing sound levels.

2.20.34 In locations with lower existing sound levels, construction noise adverse effects 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 adverse effects are considered to be significant when assessed on a community basis taking account of the local context.

2.20.35 Table 8 presents the direct adverse effects on residential communities and shared open areas that are considered to be significant on a community basis. The direct adverse construction noise effects on the areas of the residential communities identified in Table 8 are considered to be significant.

Table 8: New or different significant direct adverse effects on residential communities.

Significant effect number	Type of significant effect	Time of Day	Location	Cause (construction activities)	Assumed duration of impact and details.
CSV27-C01	Construction noise	Night-time	Approximately 137 dwellings on Southwold Spur, Mead Avenue and Maplin Park (AL 901167, 901168, 901169, 901172)	Night-time possessions works associated with the proposed HEx depot, Construction - Earthworks. Typical and highest monthly noise levels of 55 and 60dB to 65dB	Between four and six months
CSV27-C02	Construction noise	Night-time	Approximately 25 dwellings in Caravan Parks at Hollow Hill Lane and at the moorings for canal boats on the Grand Union Canal in the vicinity of Hollow Hill Lane, Langley (AL 901174, 901176)	Night-time possessions works associated with the proposed HEx depot, Construction - Earthworks. Typical and highest monthly noise levels of 55 and 60dB	Between six and nine months

Residential receptors: indirect effects

2.20.36 Construction traffic is likely to cause adverse noise effects on residential receptors along Bangors Road, South (CSV27-C03). Approximately 19 dwellings located immediately adjacent to the road are forecast to experience an increase in outdoor noise levels of around 1 dB in an area where there is a high existing sound level during the peak months.

2.20.37 This adverse effect would be a change in the acoustic character of the area such that there is a perceived change in the quality of life. The effect is considered to be significant when assessed on a community basis taking account of the local context.

Non-residential receptors - direct effects

2.20.38 No direct construction noise significant effects are likely on non-residential receptors as a result of the proposed HEx depot.

Non-residential receptors - indirect effects

2.20.39 No indirect construction noise significant effects are likely on non-residential receptors as a result of the proposed HEx depot.

Cumulative effects

2.20.40 This assessment has considered the potential cumulative construction noise effects of the proposed HEx depot and other committed developments. In this area, no committed developments are due to be built at the same time as the proposed HEx depot and accordingly, construction noise or vibration from the proposed depot is unlikely to result in any significant cumulative noise effects.

Summary of likely residual significant effects

2.20.41 The avoidance and mitigation measures, including noise insulation, will reduce noise inside all dwellings from the construction activities such that it is does not reach a level where it would significantly affect residents.

2.20.42 The measures avoid adverse effects from construction noise on the majority of residential communities. Despite the measures, the adverse effects on the following areas of local residential community are considered significant:

- Southwold Spur, Mead Avenue and Maplin Park in close proximity to the works; and
- Mansion Lane and Dudley Wharf caravan sites, Hollow Hill Lane and moorings for canal boats on the Grand Union Canal in the vicinity of Hollow Hill Lane in close proximity to the works.

2.20.43 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 main ES Volume 1 Section 1.4).

Effects arising from operation

Avoidance and mitigation measures

2.20.44 Significant noise effects from the operational static sources such as mechanical ventilation at stations and line-side equipment will be avoided through their design and the specification of noise emission requirements (for further information please see main ES Volume 5: Appendix SV-001-000).

2.20.45 The proposed HEx depot site will be planned to reduce noise effects at adjacent receptors. Mitigation will include: limiting the sounding of train horns; control of noise from train movements along tightly curved tracks including wheel squeal; control of train equipment such as heating, ventilation and air-conditioning units while vehicles are stabled; control of noise from maintenance and cleaning through the design of the maintenance sheds, and enclosures for the carriage wash.

2.20.46 Significant ground-borne noise or vibration effects will be avoided or reduced through the design of the track and track-bed.

Assessment of impacts and effects

Residential receptors: direct effects –individual dwellings

2.20.47 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

2.20.48 The avoidance and mitigation measures in this area will avoid significant airborne noise effects on all receptors.

Residential receptors: indirect effects

2.20.49 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

Non-residential receptors: direct effects

2.20.50 The assessment of operational noise and vibration indicates that no significant effects are likely.

2.20.51 The assessment of effects on non-residential receptors has been undertaken on a reasonable worst-case basis. Further information can be found in SES and AP2 ES Volume 5: Sound, Noise and Vibration Appendix SV-004-027.

Non-residential receptors: indirect effects

2.20.52 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

Cumulative effects

2.20.53 Consideration of the other proposed amendments, main ES corrections and committed developments[43] identified in the AP2 revised scheme would not alter the outcome of the assessment of this amendment with respect to operational sound, noise or vibration.

2.20.54 The cumulative effects of different topics on the receptors in the locale of the proposed amendment are considered within the socio-economic and community sections.

Summary of likely significant residual effects

2.20.55 The mitigation measures reduce noise inside all dwellings such that it does not reach a level where it would significantly affect residents.

2.20.56 The avoidance and mitigation measures in this area will avoid noise and vibration adverse effects on receptors and communities including shared open areas.

2.20.57 HS2 Ltd will continue to seek reasonably practicable measures to further reduce operational sound, noise and vibration levels. In doing so it will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the

[43] In addition to those considered within the Main ES

measures. The outcome of these activities will be reflected in the Environmental Minimum Requirements.

2.21 Traffic and transport

Scope, assumptions and limitations

2.21.1 The assessment scope, key assumptions and limitations for traffic and transport are largely as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 -000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES. However, recognising the timing of the construction of the proposed HEx depot, construction impacts are considered against a 2018 future baseline in place of the 2021 baseline used for HS2 generally.

2.21.2 The study area includes the strategic transport network that comprises of the A4 and M4 to the south, the A40 & M40 to the north, the M25 to the east and local roads affected by the scheme. The Slough Arm of the Grand Union Canal runs east west through the area with the GWML railway lines to the south.

2.21.3 The baseline forecast traffic flows for the future years of assessment have been derived using overall growth forecasts based on Transport for London (TfL)'s West London Highway Assessment Model , which has also been used for the CFA areas to the east for the SES and AP2 ES. Growth factors from the Department for Transport's traffic forecasting tool, Trip End Model Presentation Program (TEMPRO[44]), were also reviewed in determining forecast road traffic growth.

2.21.4 The effects on traffic and transport have been assessed quantitatively, based on baseline traffic conditions and future projection scenarios. Construction traffic has been assessed on the assumption that all excavated material from the work sites will be removed by road.

2.21.5 A report on traffic and transport and surveys undertaken within the area is contained in SES and AP2 ES Volume 5: Traffic and Transport Appendix: TR-001-000, Transport Assessment.

2.21.6 Engagement has been undertaken with the key transport authorities Slough Borough Council, Buckinghamshire County Council, South Bucks District Council and also with TfL.

2.21.7 With regard to traffic and transport, the main issues are changes in traffic during construction and operation, particularly in relation to increased traffic as a result of construction vehicles.

Baseline

Existing baseline

2.21.8 Existing conditions have been determined through site visits, specially commissioned transport surveys and liaison with relevant transport authorities and stakeholders to source traffic data, PRoW and accident data.

[44] Department for Transport's Trip End Model Presentation Program

2.21.9 Baseline traffic surveys were undertaken in 2014/15 to assist in confirming prevailing traffic flows. These included automatic traffic counts and junction turning counts. These were undertaken following introduction of the 20 mph zone on Langley High Street in late 2014.

2.21.10 The strategic transport network in the area comprises the A4 and M4 to the south, the A40 and M40 to the north, and the M25 to the east. The Slough Arm of the Grand Union Canal runs east west through the area with the GWML railway lines to the south of this. Footpaths IVE/15A/1, IVE/17/5, and WEX/18/3 are in the proximity of the proposed HEx depot.

2.21.11 Whilst there are no direct accesses onto the M25 in the area, the A412 runs southwards from the M40 J1/A40 Denham roundabout, to connect to the B470 Langley Park Road, and also provides access to the village of Iver. Bangors Road and Thorney Lane run in a north south direction on the east side of the area and lead to the A40 to the north and southwards to the A4.

2.21.12 The western access to the proposed depot is reasonably well connected to the wider highway network, with access to the M4 gained via the junction of the B470 Langley High Street and A4, approximately 1.5km to the south of the proposed depot access road. There is evidence of queuing occurring on the southbound approach to the A4 junction.

2.21.13 The eastern access via Thorney Lane Business Park is well connected to the wider highway network, with access to/from M40 in the north via M40/A40 - Denham Roundabout, A412, Bangors Road and Thorney Lane. Further access to the M4 in the south is via North Park and London Road.

2.21.14 There are two discrete bridge structures on the B470 Langley Park Road. Approximately 100m to the north of the proposed depot access road a bridge carries the road over the Grand Union Canal. There is no evident weight restriction in place on this bridge. To the south, a low over-bridge carries the GWML over the carriageway with a height restriction of 3.8m.

2.21.15 Hollow Hill Lane/Market Lane located to the east of the proposed main depot site, is a single carriageway road, approximately 6.5m in width. There is evidence of encroachment in to the verge areas where large vehicles are required to pass each other. The road passes under a bridge carrying the GWML overhead, with a height restriction of 3.8m. To the north, the road passes over the Grand Union Canal via a weak bridge with a 10 ton weight limit. Access to the Mansion Lane caravan site is located immediately to the south of the bridge, while access to a boat yard and further caravan park is located to the immediate north of the bridge.

2.21.16 Parking in residential streets to the north and south is controlled in the form of resident only restrictions and double yellow lines, typically restricted to two hours in the period 9am-5pm on weekdays.

2.21.17 Parking opportunities in the immediate vicinity of the proposed western access for the depot are limited, with 'no waiting and loading at any time' restrictions in place on some sections of the B470 and opportunities beyond this limited by the nature of the road and traffic flows.

2.21.18 Uncontrolled on-street parking is available in Waterside Drive within the Langley Quay

2.21.19 Parking opportunities in the immediate vicinity of the eastern access are negligible due to ongoing construction opposite the Thorney Lane Business Park access onto Thorney Lane public highway. Heavy on-street parking occurs over peak periods on the section of High Street, Iver connecting Thorney Lane north and Bangors Road South.

2.21.20 Bus route 58 operates a half hourly service on the B470, serving Uxbridge to the north and Langley and Britwell in the south.

2.21.21 There are no bus routes on either Thorney Lane or North Park.

2.21.22 Langley station is located immediately to the south of the proposed depot location.

2.21.23 Iver station is located to the east of the proposed depot location. The access to the station is via Bathurst Walk off Thorney Lane.

2.21.24 An access path provides dedicated pedestrian access to Langley Station from the south, with the path entrance being located on the B470 opposite the junction with Alderbury Road.

2.21.25 There are no controlled pedestrian crossings along the section of the B470 Langley Park Road/Station Road in the vicinity of the proposed new depot access road or along the section of Thorney Lane in the vicinity of the proposed eastern access point for the new depot.

2.21.26 Advisory cycle lanes are provided on the B470, south of the proposed depot access road.

2.21.27 There is no dedicated cycle provision on Thorney Lane, other than a short section of cycle lane provided at the eastern end of North Park.

2.21.28 The Grand Union Canal passes in an east-west direction immediately north of the proposed depot site access road on the B470. The towpath along this section of the canal is on its southern bank with access available from the B470 Langley Park Road and further to the east on Hollow Hill Lane.

Future baseline

2.21.29 Forecast traffic growth in the area, in peak hours to 2021 without the scheme is expected to be very similar to that within the M25, which TfL modelling indicates is approximately zero growth. For this assessment background traffic levels have been taken as unchanged from 2014 levels, although it is recognised that there is likely to be further peak spreading with limited traffic growth on roads outside the peak periods.

Construction (2018)

2.21.30 Construction activities have been assessed against 2018 baseline traffic flows, irrespective of when they occur in the construction period. TfL's traffic models indicate that changes to future baseline traffic volumes on the A40 to the immediate north during peak hours are expected to be close to zero or reduce between 2012 and 2018 and unchanged traffic levels are the basis of this assessment. TEMPRO indicates

growth of up to 0.5 per cent per annum between years 2014 and 2021. This is not considered to represent a material difference for the assessment.

Operation (2026)

2.21.31 The assessment of operations of the depot facility is based on no changes to background traffic levels with zero growth rate in background peak hour traffic between 2012 and 2026.

Operation (2041)

2.21.32 The assessment of operations of the depot facility is based on no changes to background traffic levels with zero growth rate in background peak hour traffic between 2012 and 2041.

Effects arising during construction

Avoidance and mitigation measures

2.21.33 The following measures have been included as part of the engineering design of the proposed HEx depot and will avoid or reduce effects on transport users:

- where reasonably practicable road closures will be limited to overnight and/or weekends, although traffic management is required for reconstruction of Hollow Hill Lane;
- maintaining a limited traffic flow (e.g. through one-way or shuttle working) and introducing short term local traffic diversions where necessary; and
- HGV routeing as far as reasonably practicable along the strategic road network and using designated routes for access, as shown on map TR-03-HEx in SES and AP2 ES Volume 5: Traffic and Transport Map Book.

2.21.34 The draft CoCP (see main ES: Volume 5: Appendix CT-003-000) includes measures which seek to reduce the impacts and effects of deliveries of construction materials and equipment, including reducing construction lorry trips, especially during peak background traffic periods. The draft CoCP includes HGV management and control measures.

2.21.35 Where reasonably practicable, the number of private car trips to and from the site (both workforce and visitors) will be reduced by encouraging the use of alternative modes of transport or vehicle sharing. This will be supported by an over-arching framework travel plan that will require travel plans to be used, along with a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the proposed HEx depot. 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. Where reasonably practicable, particularly in the rural context, this will encourage the use of sustainable modes of transport or vehicle sharing.

2.21.36 The measures in the draft CoCP (Section 14) include clear controls on vehicle types, hours of site operation, and routes for heavy goods vehicles, to reduce the impacts of road based construction traffic. In order to achieve this, generic and site specific management measures will be implemented during construction of the proposed HEx

depot on or adjacent to public roads, bridleways, footpaths and other PRoW affected by the proposed HEx depot as necessary.

Assessment of impacts and effects

Temporary effects

2.21.37 During the peak construction period HGV movements to and from the proposed site will average 500 HGV combined two-way trips/day (equivalent to 26 HGV movements per direction/hour) for approximately 12 months from September 2017, reducing to less than 50 HGVs combined two way trips/day outside of the peak construction period.

2.21.38 Construction traffic is expected to travel to/from the proposed depot site primarily using the Thorney Lane access to the east and with a more limited volume via the west access and Station Road. The proposed construction lorry routes are:

- eastern access: To/from north of site via – M40/A40 (Junction 1 - Denham Roundabout) – A412, Denham Road – Bangors Road (N & S) – High St – Thorney Lane (N) – Thorney Lane Business Park;
- eastern access: To/from south of site via M4 (Junction 5 Langley Roundabout) – London Road –Sutton Lane – North Park – Richings Way –Thorney Lane (S) – Thorney Lane Business Park; and
- western access: To/from north of site via – M40/A40 (Junction 1 - Denham Roundabout) –A412 – Wood Lane – Langley Park Road – Station Road – Station Approach.

2.21.39 The proposed construction traffic routes are shown on maps CT-05-154 to CT-05-155 maps in SES and AP2 ES Volume 4: Off-route Effects Map Book.

2.21.40 For construction, the expected directional traffic distribution will be 10% via the west access northwards, 70% via the east access northwards and 20% via the east access southwards to the A4. Access to the motorway network is via the M40, to the north, and the A4/M4 to the south.

2.21.41 The effects of HS2 construction traffic on overall traffic volumes in the peak period) is low on most of the routes used by construction traffic with the exception of the following:

- A412, Denham Road (an increase of 70% in HGVs during the AM peak and 100% during the PM peak);
- Bangors Road (an increase of 300% in HGVs during the AM peak and 225% during the PM peak); and
- Thorney Lane (an increase of 140% in HGVs during the AM and PM peak traffic hours).

2.21.42 Despite large percentage increases in HGV flows on these roads, the increases in overall traffic levels in the AM and PM peak periods on these routes is between 3.5 and 8 per cent.

2.21.43 The proposed works will require the realignment of Hollow Hill Lane by up to approximately 25m to the west of its existing alignment, its lowering by approximately 4m and the provision of a new road underbridge. In order to segregate the worksite from live traffic, Hollow Hill Lane will be reduced to a single lane with two way traffic light control. This will be for a period of three months while the protection slab work commences and will not result in any significant effects. Once the realignment work is complete, traffic will be switched to this new route with two lane operation restored.

2.21.44 The increases in HGV flows on the A412 Denham Road, Bangors Road and Thorney Lanewill result in an increase in congestion[45] at major connecting junctions. There will be significant adverse effects in relation to delay and congestion at the following locations;

- A412 Denham Road/Bangors Road North – moderate adverse significant effect;
- Bangors Road/A4007 Slough Road – moderate adverse significant effect;
- Bangors Road South/High Street, Iver – moderate adverse significant effect; and
- High Street, Iver/Thorney Lane North – moderate adverse significant effect.

2.21.45 There will also be limited impacts on the A40 Denham roundabout, which is in CFA7. These are, however, not significant.

2.21.46 The changes in HGV traffic also result in adverse significant effects in relation to traffic related severance[46] for non-motorised road users due to increased HGV traffic flows (i.e. more than 30% increase in HGVs) in the following sections of road:

- A412 Denham Road (between Bangors Lane and M40 Denham roundabout) – major adverse significant effect;
- Bangors Lane (between High Street, Iver and A412 Denham Road) – major adverse significant effect;
- Thorney Lane (between Ridgeway and High Street, Iver) – major adverse significant effect;
- Langley Park Road (between Canal Wharf (S) to Trenches Lane (N)) – moderate adverse significant effect; and
- Sutton Lane (between Hurricane Way to Grasholm Way) – moderate adverse significant effect.

[45] 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 HEx depot and the increases in traffic due to the proposed HEx depot 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 HEx depot 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 HEx depot but the increase in flows will result in occasional queues and delays or small increases in existing delays.

[46] 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.

2.21.47 In addition, the changes in HGV traffic result in adverse significant effects in relation to traffic related severance for non-motorised road users in the following locations, but the effect will be mitigated by the existence of pedestrian crossing facilities:

- High Street, Iver (between Thorney Lane and Bangors Road – minor adverse significant effect;
- Station Approach for Langley station – minor adverse significant effect; and
- Thorney Lane business park approach road– minor adverse significant effect.

2.21.48 Apart from the general impact of congestion, the proposed HEx depot is expected to have little effect on bus routes with no full closures on scheduled routes.

2.21.49 There will be limited temporary diversion of footpaths IVE/15A/1, IVE/17/5, and WEX/18/3 in the proximity of the proposed HEx depot, including the canal towpath. However these diversions will be short term (typically over periods of not more than a few days) and not significant.

Permanent effects

2.21.50 Any permanent construction effects have been considered in the operations phase assessment. This is because the impacts and effects of the forecast increases in travel demand and the wider impacts and effects of the operation phase need to be considered together.

Cumulative effects

2.21.51 The assessment includes the cumulative effects of planned committed development during operation by taking this into account within the background traffic growth. The assessment considers in-combination effects by taking into account transport impacts as a result of the AP2 revised scheme in CFA6 (South Ruislip to Ickenham) and CFA7 (Colne Valley). However, there are no impacts from these CFA areas expected in this CFA.

Other mitigation measures

2.21.52 The implementation of the draft CoCP (see Volume 5: Appendix CT-003-000) in combination with the construction workforce travel plan will, to some degree, mitigate the transport related effects during construction of the Langley HEx depot. 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.

2.21.53 To seek to mitigate the effects on the High Street, Iver, alternative routes will be considered in discussion with the local authorities.

Summary of likely significant residual effects

2.21.54 Changes in traffic flows related to construction traffic associated with the proposed HEx depot are expected to lead to increased congestion and delays for road users at the junctions of: A412 Denham Road/Bangors Road North; Bangors Road/A4007 Slough Road; Bangors Road South/High Street, Iver; and High Street, Iver/Thorney Lane North.

2.21.55 Increases in traffic flows due to increased construction traffic will also result in increased traffic severance for non-motorised road users on parts of A412 Denham Road, Bangors Lane, Thorney Lane (south and north sections), Langley Park Road, Sutton Lane, Iver High Street, Station Approach road for Langley station and Thorney Lane business park approach road.

2.21.56 The significant effects are shown on map the TR-03-HEx series in SES and AP2 ES Volume 5: Traffic and Transport Map Book.

Effects arising from operation

Avoidance and mitigation measures

2.21.57 The framework travel plan sets out how travel plans will be used to mitigate the impacts of traffic and transport movements associated with the maintenance and operation of the proposed HEx depot. This will help reduce any traffic impacts in this area, in particular by promoting the use of sustainable modes.

Assessment of impacts and effects

2.21.58 This section looks at the operational effects of the proposed HEx depot on the surrounding local road network. The operational impacts relate to:

- increased vehicular traffic on the approach routes to the HEx depot; and
- parking for staff and visitors.

2.21.59 The proposed depot is expected to operate 24 hours a day, seven days a week in two shifts with the principal access from Langley Park Road. During operations there are expected to be fewer than 10 HGVs arriving at the depot per day on average.

2.21.60 There will be only limited and occasional maintenance vehicle access to the HEx depot from the eastern side via Thorney Lane Business Park with no general staff or visitor access from Thorney Lane.

2.21.61 Drivers based at the depot will normally travel outside the AM and PM peak traffic periods (0700-1000hrs and 16.00-19.00hrs) and need to travel by car. Consequently, their movement will not have any impact on the peak hour traffic flow.

2.21.62 Approximately 30-40 full time staff will work on the site during the day shift. This does not include the drivers or the contractors that will visit the depot during the day. The depot will require up to 50 parking spaces available for their permanent staff, drivers, visitors and contractors combined. It is expected that only permanent staff working the day shift (apart from the drivers and contractors) will arrive at the depot during the peak hours, with up to 30 vehicles arriving at or leaving the depot during the peak hours.

2.21.63 Recognising that staff will arrive from both north and south and the low level of operational access, when compared to the peak background traffic flows the operational flows are very low and no significant traffic impact will occur on the local road network.

2.21.64 Footpaths IVE/15A/1, IVE/17/5, and WEX/18/3 will not be permanently affected.

Cumulative effects

2.21.65 The assessment includes the cumulative effects of planned committed development during operation by taking this into account within the background traffic growth. The assessment considers in-combination effects by taking into account transport impacts as a result of activities in other CFA areas. However, for this area, there are no effects from other CFAs expected.

Other mitigation measures

2.21.66 The travel plan for the proposed HEx depot will, to some degree, mitigate the transport related impacts during operation by promoting the use of sustainable modes by workers. The reductions in impacts arising from the travel plan measures have not been included in the assessment, which will mean that the extent, magnitude and significance of adverse impacts may be overstated.

Summary of likely significant residual effects

2.21.67 Operation of the HEx depot in Langley is not expected to result in any significant traffic and transport effects.

2.22 Water resources and flood risk assessment

Scope, assumptions and limitations

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

2.22.2 The main environmental features of relevance to water resources and flood risk as shown on map WR-03-HEx within the SES and AP2 ES Volume 5: Water Resources Map Book include:

- the Horton Brook, and associated floodplain flowing in a south easterly direction through the proposed HEx depot site;
- an unnamed watercourse flowing in a south easterly direction through the proposed HEx depot, located to the east of the Horton Brook;
- the Grand Union Canal to the north of the proposed HEx depot site;
- the historic Iver, Hollow Hill Lane and Thorney Lane Landfills;
- the Lynch Hill Gravel and the Taplow Gravel, both Secondary aquifers; and
- licensed private and public water supply groundwater abstractions and associated SPZ.

2.22.3 Key environmental issues relating to water resources and flood risk include:

- potential impacts on groundwater quality as a result of construction activities associated with potential water storage tank(s), inspection pits and storage/works buildings;
- potential impacts of construction on shallow groundwater in hydraulic

connectivity with surface water features;

- potential impacts on the risk of river flooding at the site and more widely; and
- the realignment of the Horton Brook and the unnamed watercourse.

2.22.4 The spatial scope of the assessment was based upon the identification of surface water and groundwater features within 1km of the limit of the land required for construction of the proposed HEx depot, taking account of constraints imposed by lack of hydraulic connectivity where appropriate. For the purposes of this assessment this is defined as the study area.

2.22.5 The railway land immediately south of the site has been included within the Crossrail project and the published Water Technical Specialist Report and Environmental Statement[47] have been referred to for baseline information.

2.22.6 The future baseline will be affected as a result of work being implemented for Crossrail. These changes are included in the future baseline.

2.22.7 The flood risk assessment for Crossrail identifies an area for approximately 715m^3 of replacement floodplain storage within the same area as the proposed HEx depot replacement floodplain storage area. It has been assumed, as both Crossrail works and the works to construct the proposed HEx depot will take place at the same time, during 2017, that the design for the proposed HEx depot replacement floodplain storage area will also incorporate floodplain storage provision for Crossrail.

2.22.8 No surface water or groundwater licensed discharge data were available for this area other than data published in the Crossrail ES.

2.22.9 It is assumed, because there are no areas of deep excavation, no works associated with the proposed HEx depot scheme in the study area will penetrate below the base of the London Clay Formation.

2.22.10 SES and AP2 ES Volume 5: Water Resources Appendix WR-001-000 contains a route-wide Water Framework Directive (WFD) compliance assessment. The WFD compliance assessment contains an additional surface water body and an additional groundwater body potentially affected by the proposed Hex depot; and

2.22.11 The Environment Agency has confirmed that there is no existing hydraulic model of the Horton Brook and tributaries at the site. Hydraulic modelling is therefore being undertaken as part of the Flood Risk Assessment, to be reported in a future ES. Information from the Slough Borough Council Strategic Flood Risk Assessment (SFRA), Preliminary Flood Risk Assessment (PFRA) and Surface Water Management Plan has been used to define the baseline for flood risk from other sources within the study area.

[47] http://www.crossrail.co.uk/about-us/crossrail-bill-supporting-documents/specialist-technical-reports/ STR14 Water Resources Impacts, Volume 01 Main Report R0003 ImpactsWest.pdf

Baseline

Existing baseline - Surface water resources

Surface water features

2.22.12 All water bodies within the study area, with the exception of the Grand Union Canal, fall entirely within the Colne catchment which itself falls within the Thames River Basin District as set out in the Thames River Basin Management Plan[48] (RBMP).

Table 9: Surface water features potentially affected by the revised scheme

Water feature	Location description	Watercourse classification[49]	WFD water body and current overall status	WFD status objective (by 2027 as in RBMP)	Receptor value[50]
Horton Brook	Crossed by the revised scheme in the west.	Main river	Horton Brook - (GB106039023040) Moderate	Good	High
Grand Union Canal - Slough Arm	Located to the north of the revised scheme	Artificial	Grand Union Canal, Slough Arm (GB70610078) Good potential	Good potential (by 2015)	High
Unnamed watercourse	Flows parallel to Horton Brook Crossed in the west of the revised scheme.	Ordinary watercourse	No status class in RBMP – assumed status (Horton Brook) Moderate	No status class in RBMP – assumed status (Horton Brook) Good	Moderate
Unnamed watercourse (east of study area)	Flows towards the Grand Union Canal but unlikely to flow into the canal Crossed in the east of the revised scheme.	Ordinary watercourse	No status class in RBMP – assumed status (Horton Brook) Moderate	No status class in RBMP – assumed status (Horton Brook) Good	Moderate

2.22.13 The Horton Brook is classified by the Environment Agency as a main river with Moderate status. The objective for 2027 for the Horton Brook is Good status as shown on map WR-03-HEx in SES and AP2 ES Volume 5: Water Resources Map Book.

2.22.14 There are no current licensed surface water discharge data available within 1km of the route in the study area. The Crossrail ES reports two discharges at the site and two more discharging to land via injection wells around 500m north of the site. The

[48] Environment Agency (2009) River Basin Management Plan, Thames River Basin District

[49] 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.

[50] For examples of receptor value see Table 43 in the SMR addendum (Volume 5: Appendix CT-0001-000/2).

Environment Agency report one surface water abstraction licence on the Horton Brook over 1 km downstream of the site.

2.22.15 There is one WFD water body that will be crossed by the proposed HEx depot scheme: the 'Horton Brook'. The current overall status of this water body is Moderate. The Environment Agency predicts that by 2027 the Horton Brook WFD water body will be of Good status.

Existing baseline – groundwater resources

2.22.16 A summary of the superficial and bedrock geology and hydrogeology is presented in Table 10. Unless otherwise stated, the geological groups listed are all crossed by the route.

Table 10: Summary of geology and hydrogeology in the study area

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						
River Terrace Deposits - Lynch Hill Gravel	Within the majority of the study area	Permeable gravel, sandy and clayey in part	Secondary A	Lower Thames Gravels (GB40603G000300) Poor	Good status	Moderate
River Terrace Deposits - Taplow Gravel	Outcrops in patches	Sand and Gravel	Principal	Lower Thames Gravels (GB40603G000300) Poor	Good status	High
River Terrace Deposits - Langley Silt Member	Outcrops along the unnamed watercourse on the east of the study area.	Clay and silt	Unproductive	Lower Thames Gravels (GB40603G000300) Poor	Good status	Low
Bedrock						
London Clay Formation	Underlying superficial deposits across site	Stiff grey, brown heterogeneous clay with closely spaced fissures	Unproductive	Not assessed by Environment Agency	Not assessed by Environment Agency	Low
Lambeth Group	Beneath the London Clay Formation	Silty clay with sand towards the top. Silty clay with occasional calcareous nodules towards the base, and limestone bands	Secondary A	Not assessed by Environment Agency	Not assessed by Environment Agency	Moderate

Geology	Distribution	Formation description	Aquifer classification	WFD water body and current overall status	WFD status objective (by 2027 as in RBMP)	Receptor value
Chalk Group	Underlying Lambeth Group	Soft to medium hard chalk with marl seams and flint bands and tabular flint seams	Principal	Not assessed by Environment Agency	Not assessed by Environment Agency	High

2.22.17 Superficial deposits are present over the entire study area. These largely consist of River Terrace Deposits (Lynch Hill Gravel) to the east, with Langley Silt Member underlain by the Taplow Gravel in the central and western areas of the site. Historic borehole logs on the site show that the Langley Silt Member is up to 2m thick, with the Taplow Gravel between 2m and 6m thick.

2.22.18 Gravel deposits, where not worked out, form a shallow aquifer across the study area. The historic borehole logs show that in August 2005 groundwater in the Taplow Gravel was struck between 5 to 6m BGL in the central part of the site (approximately 21 to 22m above Ordnance Datum (AOD)). The base of the Horton Brook is approximately 25 to 25.5m AOD. Since there is only limited groundwater level data it is possible that groundwater in the gravels are hydraulically connected to the Horton Brook and unnamed watercourses that cross the study area. Any potential wide scale changes to the groundwater levels and quality in the gravels may therefore impact surface water quality and levels and vice versa.

2.22.19 Vertical groundwater flow is generally restricted by the presence of the London Clay Formation overlying the Lambeth Group and the Chalk Group. The London Clay Formation is generally found to a maximum depth of approximately 35m BGL. No works associated with the proposed HEx depot are considered likely to penetrate below the base of the London Clay Formation.

2.22.20 There are two groundwater abstractions from the chalk aquifer for public water supply (PWS) with SPZ in the study area. The PWS are located to the west of the proposed HEx depot site, which also crosses the designated SPZ3. The PWS sources are located 3.8km and 4km to the west of the proposed HEx depot.

2.22.21 There is one other groundwater abstraction within 1km of the revised scheme, located approximately 400m north of the boundary of the proposed HEx depot. This groundwater abstraction ref. 28/39/28/0558 abstracts from the chalk and is held by Iver Golf & Leisure Centre Ltd. There is the potential for unlicensed abstractions and licensed or unlicensed discharges to exist but no data are currently available.

2.22.22 No water dependent habitats were identified for the study area.

Existing baseline – flood risk

River flooding

2.22.23 The Horton Brook has a catchment size of 11km2 at the downstream site boundary which is the culvert beneath the GWML railway embankment. The proposed HEx depot boundary falls partially within Flood Zone 3 and Flood Zone 2 at this location. Approximately 2.7ha of the depot footprint falls within Flood Zone 3 and 2.9ha within

Flood Zone 2. Additionally, approximately 0.7ha of Flood Zone 3 and 1.7ha of Flood Zone 2 falls to the south of the proposed bund along the southern bank of the Horton Brook.

2.22.24 The Grand Union Canal and existing GWML railway embankment are both identified in the Slough Borough Council SFRA as informal flood defence lines.

Surface water flooding

2.22.25 There are locations that are shown in the Slough Borough Council PRFA and Surface Water Management Plan to be at risk of surface water flooding within the depot boundary. In particular, along the Horton Brook and on the upstream side of the existing GWML railway embankment. Environment Agency mapping shows a risk of surface water flooding (up to 'High' chance (1 in 30 year return period (3.3% annual probability) and 300 – 900mm depth in the 1 in 1000 year return period (0.1% annual probability) rainfall event, defined as a 'Low' chance event) along the Horton Brook, north of the GWML railway embankment, and to the north of the Horton Brook immediately downstream (south) of the Grand Union Canal.

2.22.26 The extent of the risk of flooding from surface water falls within the flood zones associated with the Horton Brook. Any effects and mitigation proposed under the risk of flooding from rivers will equally apply to this source of flooding and the two are therefore considered synonymous in the following assessment.

Sewer flooding

2.22.27 The area is not shown to be at significant risk of flooding from sewers based on the Thames Water DG5 data utilised in the PFRA. This flood source is therefore not considered further within this assessment.

Artificial water bodies

2.22.28 There is a risk of flooding in the event of a breach in the Grand Union Canal embankments to the north of the proposed depot. The Canal & River Trust is responsible for the maintenance of the canal network. The Slough Arm of the Grand Union Canal is four miles long and has no locks. The nearest lock is Cowley Lock on the main branch of the Grand Union Canal close to the junction with the Slough arm. Consequently, there is not expected to be a significant variation in the water level within the canal and there is no significant risk of the canal overtopping.

2.22.29 According to the Environment Agency Reservoir Inundation Map, there is an additional risk of flooding along the Horton Brook valley in the event of failure of Black Park Lake, approximately 3km upstream. Stagnant (<0.25m/s velocity) flooding of up to 2m depth is shown to the northern side of the existing GWML embankment. Black Park Lake is owned and maintained by Buckinghamshire County Council. The likelihood of flooding occurring from reservoirs is extremely low due to regular inspections and supervision by reservoir panel engineers required by the reservoirs Act 1975. Given the distance of the proposed HEx depot scheme from the reservoir, it will not affect the likelihood of reservoir failure, and therefore this source has not been considered further within this assessment.

Future baseline

Construction (2017)

2.22.30 Crossrail will be constructed to the south of the proposed HEx depot scheme footprint at Langley, to the north of the GWML railway embankment. According to the accompanying Flood Risk Assessment appendix[51] of the Crossrail ES, the existing culvert under the GWML will be extended. The Crossrail embankment will result in the loss of 715m^3 of floodplain storage, which is proposed to be mitigated through lowering of the area between the proposed HEx depot scheme and the Grand Union Canal to provide replacement floodplain storage.

2.22.31 All further committed developments are required to comply with the National Planning Policy Framework, development plans and other legislation and guidance on flood risk that require all development to be safe without increasing the risk of flooding elsewhere. As such, developments are expected to have a neutral or net positive (i.e. reduction in flood risk) effect on the flood risk baseline. Therefore, any flood risk effects arising from the proposed HEx depot scheme in design will not be exacerbated by other committed developments.

Operation (2020)

2.22.32 Current projections to the 2080s indicate that climate change may affect the future baseline against which the impacts of the proposed HEx depot 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 in the case of flood risk from rivers, these changes are not considered to result in changes to the level of significance of the effects reported in the proposed HEx depot scheme ES. A 20% increase in flows is included in the modelling of the Horton Brook being undertaken to inform the detailed design to allow for predicted climate change as recommended by the Environment Agency[52].

2.22.33 Further information on the potential additional impacts of climate change for water resources and flood risk is provided in Volume 1 and Table 11 of Section 6A of the SMR Addendum of the main ES.

Effects arising during construction

Avoidance and mitigation measures

2.22.34 This assessment assumes implementation of the draft CoCP. The general approach to mitigation is set out in Volume 1 of the main ES.

2.22.35 All surface water crossings will be designed in consultation with the Environment Agency and, where appropriate, lead local flood authorities to seek to meet their objectives with respect to flood risk and WFD. Where reasonably practicable, the permanent channel realignments will be constructed in advance of other activities associated with the construction of the proposed HEx depot. The design mitigation,

[51] http://www.crossrail.co.uk/about-us/crossrail-bill-supporting-documents/specialist-technical-reports/ STR14 Water Resources Impacts, Volume 02 Appendices R0016 FloodRisk.pdf
[52] Environment Agency (2013) *Climate change allowances for planners*

including consideration of design features aligned with the objectives of the WFD (for example use of soft engineering solutions, aquatic marginal planting and the inclusion of natural forms). Channels and structures will be sufficiently sized to avoid a permanent impact on flow.

2.22.36 Culvert length will be reduced wherever possible and will be designed with invert levels below the firm bed of the watercourse to negate the impact on flows and sediment transfer. Where possible, consideration will be given to provide mitigation for the loss of open channel by means of sensitive design at either end of the culvert in order to retain and, if reasonably practicable, enhance the overall quality of the watercourse. Where there is loss of length due to straightening, the aim, where possible, will be to offset this by increasing channel length up or downstream of the culvert to at least match the lost length of channel. Culverts will be designed in line with Construction Industry Research and Information Association (CIRIA)[53] and Environment Agency guidance. The mitigation specifically for the ecology of the watercourses is considered in Section 7, Ecology.

2.22.37 The Environment Agency and, where appropriate, lead local flood authorities will be consulted on the design of the culverts and diversion proposals and any other mitigation measures. Such other mitigation measures will include:

- minimising the culvert lengths as far as reasonably practicable, even if this requires some realignment of the upstream approach reach;
- maintaining the natural bed profile within the channel, both in terms of channel gradients and substrates; and
- maintaining natural flow depths, widths and velocities, (including natural variance and diversity) at the culvert inlet and outlet.

2.22.38 Consideration will be given in the design of all channel works to the objectives of the WFD as described in the RBMP. This may include the use of soft engineering solutions for bank design, and the inclusion of natural forms such as berms or incorporation of a two-stage channel, riffles and pools and marginal planting, where reasonably practicable.

2.22.39 Diverted or realigned watercourses will be designed with at least equal capacity to the existing system to ensure no loss of conveyance. All culverts will be designed to convey the 1 in 100 years return period (1% annual probability flow) including an allowance for climate change, to ensure that flow continues to be conveyed downstream whilst ensuring downstream flood risk is not increased.

2.22.40 Method statements will be agreed in consultation with the Environment Agency to ensure that any temporary impacts on water quality, flow and ecology are acceptable. These will include details of suitable construction sequencing, channel stabilisation, methods for reducing and managing potential pollution events and sediment.

2.22.41 There will be embankments and bunds located within the floodplain which will result in a loss of floodplain storage. Bunds along the southern bank of the Horton Brook will

[53] CIRIA (2010), *C689 Culvert design and operation guide*, CIRIA, London, UK

result in the loss of floodplain to the south of that location. In total, a plan area of approximately 3.4ha of Flood Zone 3 and 4.6ha of Flood Zone 2 will be lost.

2.22.42 Replacement floodplain storage will be provided to mitigate for loss of existing floodplain storage associated with these components of the proposed HEx depot. The replacement floodplain storage area provided in the current design is located to the north between the proposed depot and the Grand Union Canal embankment as shown on map CT-06-154 in SES and AP2 ES Volume 4: Off-route Effects Map Book. Bunds are provided to increase the volume of storage available. Replacement floodplain storage will be provided prior to the construction of built structures within the floodplain, in consultation with the Environment Agency and lead local flood authority.

2.22.43 The replacement floodplain storage area will be provided prior to the construction of built structures within the floodplain and will therefore also mitigate temporary loss of floodplain storage resulting from these construction works.

2.22.44 The FRA for Crossrail included detailed hydraulic modelling to determine the loss in floodplain storage arising from that scheme and identified the provision of approximately 715m3 of replacement floodplain storage to the north of the Crossrail scheme, coinciding with the proposed HEx depot and the proposed HEx depot replacement floodplain storage area. It has been assumed the design for the proposed HEx depot replacement floodplain storage area will also incorporate the floodplain storage provision for Crossrail.

2.22.45 All drainage on the proposed HEx depot has been designed to reduce the rate and volume of run-off from the railway with the aim to match the existing scenario and thus prevent an increase in flood risk. Associated access roads and hard-standings will be designed to match peak runoff rates to current rates through use of sustainable drainage system techniques.

2.22.46 In accordance with Section 16 of the draft CoCP, excavated material storage and site offices will be located outside of the flood zones, where practicable, to avoid having an additional impact on the risk of flooding from the Horton Brook. This is of particular relevance to the Hollow Hill Lane underbridge satellite compound.

Assessment of impacts and effects

Temporary effects

Surface water

2.22.47 The Horton Brook and an unnamed watercourse will be permanently realigned and diverted, due to construction of the embankment for the rail lines. The two watercourses will be joined and then culverted under the proposed rail embankment.

2.22.48 For the Horton Brook, a new 400m long channel will be constructed in advance of the proposed HEx depot works and will be allowed to stabilise and vegetation to establish, to control the risk of sediment mobilisation when the brook is diverted into the new channel.

2.22.49 Due to the small scale of this diversion, and the fact that the brook is currently affected by culverts both upstream (under the Grand Union Canal) and downstream under the existing rail line, the magnitude of the impact for temporary construction is

considered moderate with the scale of remaining impact following mitigation to be negligible, with neutral effect and therefore not significant.

Groundwater

2.22.50 The western area main depot site is a brownfield site which includes a former oil depot which records suggest has been remediated by others. This area is largely underlain by the Langley Silt Formation, and the Taplow Gravel Formation. The Taplow Gravel also outcrops in isolated areas across the western part of the site. Previous site investigation suggests there is no contamination; however, prior to excavation for the construction of the main depot in this area, mitigation plans will be developed for the risk of encountering contaminated materials. This will include pre- and post-construction monitoring (as part of the requirements of the draft CoCP) which will inform the extent of existing contamination and whether this could be mobilised or dispersed as a result of construction. If necessary mitigation plans will be put in place to deal with any mobilisation of contamination. Therefore, it is concluded that groundwater quality is unlikely to degrade as a result of main depot construction. Therefore, the material excavation activities are assessed as being of negligible impact with neutral effect and not significant.

2.22.51 In the central area some of the excavation of the replacement floodplain storage area takes place on or close to the site of the former oil depot where it is assumed that contamination is likely to remain. In the area of the former oil depot the made ground and Langley Silt Formation (unproductive strata) are expected to extend up to 2m below ground and excavation in this area will not be more than half a metre and therefore there is not expected to be any groundwater in this area.

2.22.52 The excavation of the replacement floodplain storage area has the potential to impact groundwater quality due to increased sediment loads. Any potential impacts to groundwater quality resulting from increases to sediment loads will be short term and temporary and implementation of the draft CoCP will minimise impacts. Therefore the assessment shows a negligible impact and neutral effects, which is not significant.

2.22.53 The Hollow Hill Lane underbridge retaining wall (1m contiguous piled wall 15m long) will be installed in an area where there are no superficial deposits, and will therefore be installed into the London Clay Formation and is not expected to impact on groundwater in the underlying chalk aquifer.

2.22.54 To the east of Hollow Hill Lane the depot entry rail tracks will be constructed in a shallow cutting. This area is a former landfill site. Most of the eastern area is underlain by the Lynch Hill Gravel Member (River Terrace Deposits).

2.22.55 Removal of the landfill material to construct the HEx depot east connection could cause the dispersion or mobilisation of contamination into the superficial aquifer. Pre- and post-construction monitoring (as part of the requirements of the draft CoCP) will inform the extent of existing contamination and whether this could be mobilised or dispersed as a result of construction. Appropriate methods of construction will be developed to manage the risk of mobilising contamination. Therefore it is concluded that construction is unlikely to degrade groundwater quality as a result of existing landfill. Therefore, the material excavation activities are assessed as being of negligible impact with neutral effect, which is not significant.

2.22.56 There will be the potential for piling activities to cause dispersion or mobilisation of contamination in the shallow aquifer (River Terrace Deposits), particularly where the structure crosses a historic landfill site. However, where this route crosses the historic landfill, the landfill material will be excavated to the base of the slab and replaced with inert material. Piling will not extend below the base of the London Clay Formation. Any contaminated landfill material and piling arisings will be removed for disposal off site. Further discussion of the impacts on land quality is provided in Section 3.17. Therefore, piling activities are assessed to be of negligible impact with neutral effect, which is not significant.

Flood Risk

Flooding from rivers and surface water:

2.22.57 As a result of the mitigation contained within the draft CoCP and the avoidance and mitigation measures identified specifically for the proposed HEx depot, including phasing of a replacement floodplain storage area within the works, and storage of materials outside of the area of flood risk, where practicable, no significant temporary adverse effects on flood risk from rivers and surface water have been identified within the assessment.

Flooding from artificial water bodies:

2.22.58 There is a risk that ground works in the vicinity of the Grand Union Canal could affect the stability of the embankment which could lead to overtopping or breach. The ground works proposed are relatively minor, and there will be no deep excavation adjacent to or beneath the embankments. The replacement floodplain storage area will be excavated to a maximum depth of 2.5m adjacent to the canal as a result of lowering the higher north-east area of the site. Excavation in this area will be designed and constructed in such a way as to ensure that there will be no increased risk of structural instability of the canal embankment leading to settlement or failure. As a result, there will be no significant temporary adverse effect on flood risk from the Grand Union Canal during construction.

Permanent effects

Surface water

2.22.59 The Horton Brook and unnamed watercourse channels will cross the proposed HEx depot trackwork in a culvert of approximately 50m length. There is potential for permanent impacts from construction. Construction of crossings will follow best practice as set out in the draft CoCP, leading to negligible impact, with neutral effect and is therefore not significant.

Groundwater

2.22.60 There are no significant permanent effects from the construction of the proposed HEx depot.

Flood risk

2.22.61 As a result of mitigation measures included in the design, including replacement floodplain storage and the design of culverts and channel diversion, there are no anticipated significant effects on the risk of flooding from rivers and surface water.

2.22.62 Subject to design, the proposed HEx depot scheme is not expected to have an effect on the stability of the Grand Union Canal embankments, and therefore no significant effects on the risk of flooding from this source are anticipated.

Cumulative effects

2.22.63 There are no committed developments that have been identified which will result in significant temporary or permanent cumulative effects on water resources and flood risk.

Other mitigation measures

2.22.64 The draft CoCP sets out the measures and standards of work that will be applied to the construction of the proposed HEx depot (see the main ES, Volume 5: Appendix CT-003-000). These will provide effective management and control of the impacts during the construction period.

2.22.65 Generic design measures will be implemented to avoid significant adverse effects on the quality and flow characteristics of surface water courses, groundwater bodies and flood risk. These are described in Volume 1, Section 9 of the main ES.

2.22.66 Detailed mitigation measures will be built into the design of the proposed amendment, based on the hydraulic modelling to ensure no significant adverse effects on the risk of flooding.

2.22.67 Consideration will be given during detailed design of the regraded and diverted Horton Brook and unnamed watercourse channel sections to the objectives of the WFD as described in the RBMP. This may include the use of soft engineering solutions for bank design, and the inclusion of natural forms such as berms or incorporation of a two-stage channel, riffles and pools and marginal planting, where reasonably practicable.

2.22.68 No further mitigation measures are required.

Summary of likely significant residual effects

2.22.69 There would be no likely residual significant effects on surface water features, surface water abstractions, discharges or flood risk as a result of the proposed amendment acting in combination with another amendment or as a result of any relevant committed development interacting with the proposed HEx depot.

Effects arising from operation

Temporary effects

Temporary effects

2.22.70 There are no significant temporary effects from the operation of the proposed HEx depot on surface water, groundwater resources or flood risk.

Permanent effects

2.22.71 Storm water runoff from paved areas discharged to local watercourses has the potential to have a permanent impact on surface water quality. Appropriate pollution prevention measures will be incorporated to ensure that there will be no significant

effects on water quality. Therefore the assessment shows a negligible impact, with neutral effect and is not significant.

2.22.72 There are no significant permanent effects on surface water or groundwater from the operation of the proposed HEx depot.

2.22.73 Operation and management of the proposed HEx depot is not likely to have a significant adverse effect on flood risk.

Cumulative effects

2.22.74 There are no committed developments that have been identified which will result in significant temporary or permanent cumulative effects on water resources and flood risk.

Other mitigation measures

2.22.75 There are considered to be no further measures required to mitigate adverse effects on surface water, groundwater or flood risk.

Summary of likely significant residual effects

2.22.76 There would be no likely residual significant effects on surface water features, surface water abstractions, discharges or flood risk as a result of the proposed amendment acting in combination with another amendment or as a result of any relevant committed development interacting with the proposed HEx depot.

3 Modifications to the West Coast Main Line between Lichfield and Colwich

3.1 Summary of amendments

3.1.1 Table 11 provides a summary of the amendments to the original scheme described in Section 5 of Volume 4 of the main ES, which deals with a number of modifications to the WCML between Lichfield and Colwich. This is followed by a description of each amendment and assessments for the topics where there is potential for new or different likely significant effects, compared to those identified in Volume 4 of the main ES. Section 3.3 provides a summary of the residual effects predicted as a result of all three proposed amendments in this area.

Table 11: Summary of amendments to the WCML modifications between Lichfield and Colwich

Name of amendment	Description of the original scheme	Description of the AP2 revised scheme
Additional land on the WCML for track modifications east of Colwich (AP2-000-002)	Land required temporarily on the WCML to install a new crossover between the existing WCML tracks and make associated changes to the overhead lines.	Land required temporarily on the WCML to install a new crossover between the existing WCML tracks and make associated changes to the overhead lines. The permanent works are unchanged but insufficient land was included in the Bill to facilitate the installation of the crossover.
Additional land for construction access east of Colwich (AP2-000-003)	Land required temporarily to gain access to and construct a temporary crane platform to the north of the WCML east of Colwich.	Land required temporarily to gain access to and construct a temporary crane platform to the south instead of the north of the WCML east of Colwich.
Additional land for construction access east of Colwich for revised signal gantry location (AP2-000-004)	Installation of a signal gantry on the WCML and temporary land required to gain access to and construct a temporary crane platform to install the gantry immediately to the north of Dobree Close, west of the A51 in Colwich.	Installation of a signal gantry on the WCML immediately to the east instead of to the west of the A51 in Colwich. Land required temporarily to gain access to and construct a temporary crane platform immediately east instead of west of the A51 in Colwich. The revised signal gantry location does not require a change to Bill powers but the revised construction access does.

3.2 Assessment of amendments

Additional land on the WCML for track modifications east of Colwich (AP2-000-002)

3.2.1 The Bill provides for land within the WCML rail boundary to install a new track crossover (refer to main ES maps CT-05-146 and CT-05-147 in the Volume 4 Map Book) east of Colwich. However, since the submission of the Bill, it has been identified

that additional land is required within the WCML rail boundary east of Colwich in order to facilitate the installation of the new crossover. The additional area of land required temporarily is approximately 0.7ha, over a track length of approximately 250m (refer to maps CT-05-146 and CT-05-147, in the SES and AP2 ES Volume 4 Map Book). The work will be confined to the ballasted track of the WCML.

3.2.2 This amendment does not change the construction methodology, programme and access requirements reported in Volume 4 of the main ES.

3.2.3 The operational original scheme reported in Volume 4 of the main ES is unchanged by this amendment.

3.2.4 The temporary use of this additional land within the operational WCML boundary is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to: agriculture, forestry and soils, air quality, community, cultural heritage, ecology, land quality, landscape and visual assessment, socio-economics, traffic and transport and water resources and flood risk assessment. However, there are changes where reassessment is considered necessary for sound, noise and vibration. This is due to construction activities moving closer to some receptors.

Sound, noise and vibration

Baseline

3.2.5 The baseline for sound, noise and vibration is unchanged from that reported in the main ES, Volume 5, CT-007-000, Off-route effects supporting information.

3.2.6 In order to facilitate the installation of the new crossover an additional area of land on the WCML is required in the vicinity of Bishton Lane Farm (refer to SES and AP2 Map CT-05-146, B7). There are two residential properties at the farm and the existing baseline sound levels associated with these are included in Table 43 in the main ES, Volume 5, CT-007-000, Off-route Effects Supporting Information.

Effects during construction

3.2.7 The amendment will result in track modification works being undertaken closer to the two residential properties at Bishton Lane Farm, which has the potential to change the predicted construction noise levels outside these properties and increase construction noise impacts from those reported in the main ES. The main ES did not report a significant adverse construction noise effect at these two properties.

3.2.8 The construction noise levels have been predicted at Bishton Lane Farm. The assessment scope, key assumptions and limitations for sound, noise and vibration are as set out in the main ES Volume 5, CT-007-000.

3.2.9 The predicted noise levels have been assessed using the significance criteria for residential receptors set out in the main ES (Volume 5 Appendix SV-001-000). Taking account of the assumptions set out in the main ES Volume 5, CT-007-000, the duration of the impact at any one receptor will be limited and any potential adverse noise effects will be controlled and reduced by the management processes set out in the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES). The assessment has concluded that whilst an adverse impact is predicted, a significant adverse noise effect at these receptors is unlikely to occur.

Effects during operation

3.2.10 The amendment will not give rise to a new or different significant effect in comparison with those reported in Volume 4 of the main ES.

Volume 5 amendments

3.2.11 Table 12 sets out the addition to Table 46 of the main ES, Volume 5, CT-007-000, Off-route effects supporting information, required as a result of this amendment.

Table 12: Assessment of construction noise at individual properties (outside of residential community areas)

Adverse effect	Type of significant effect	Time of day	Location	Cause (construction activities)	Assumed duration of impact	Noise insulation
Bishton Lane Farm	Construction noise	Night	Two dwellings at Bishton Lane Farm	Track modifications (night only) with highest noise levels of 52dB assuming solid hoarding blocks line of sight.	Intermittent over four months	No

Additional land for construction access east of Colwich (AP2-000-003)

3.2.12 The Bill provides for land immediately to the north of the WCML to access and construct a temporary crane platform to install a new signal gantry on the WCML (refer to main ES map CT-05-147, G4 in the Volume 4 Map Book). However, since submission of the Bill it has been identified that an alternative location for the crane platform, on the south side of the WCML, provides a better solution due to easier access arrangements (refer to map CT-05-147, G5, in the SES and AP2 ES Volume 4 Map Book). Access from the A51 to the crane platform location will be via the existing farm access track and then through agricultural fields alongside the WCML.

3.2.13 This amendment does not change the construction methodology, programme and access requirements reported in Volume 4 of the main ES.

3.2.14 The operational effects of the original scheme, reported in Volume 4 of the main ES, are unchanged by this amendment.

3.2.15 The temporary use of this additional land for access to and construction of a crane platform is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the main ES with respect to: air quality, community, land quality, landscape and visual assessment, socio-economics, sound, noise and vibration, traffic and transport and water resources and flood risk assessment. However, there are changes where reassessment is considered necessary for agriculture, forestry and soils, cultural heritage and ecology.

Agriculture, forestry and soils

Baseline

3.2.16 The agriculture, forestry and soils baseline is unchanged from that detailed in the main ES, Volume 5, CT-007-000 and summarised in paragraph 5.3.10 of Volume 4 of the main ES.

Effects during construction

3.2.17 One additional agricultural holding is affected by the amended land requirement in this area. This holding comprises land lying to the south of the WCML, between the A51 and Bishton Lane, and is mainly given over to livestock (cattle and sheep). The temporary land required during construction will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in Volume 4 of the main ES. The short duration of the proposed works will be managed in accordance with the provisions of the draft CoCP (Volume 5: Appendix CT-003-000) and compensation provided, where appropriate, to accommodate farming activity.

Effects during operation

3.2.18 There were no significant operational effects on agriculture, forestry and soils reported in Volume 4 of the main ES. The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in Volume 4 of the main ES.

Cultural heritage

Baseline

3.2.19 The cultural heritage baseline is unchanged from that detailed in the main ES, Volume 5, CT-007-00 and summarised in paragraphs 5.3.8 and 5.3.9 of Volume 4 of the main ES. No designated heritage assets lie within the land required for the construction of the new access and crane platform.

Effects during construction

3.2.20 Although no designated heritage assets lie within the land required for the amended construction access, the construction of the amendment has the potential to result in permanent adverse impacts on currently unknown archaeological remains within the land required temporarily. Potential impacts will be addressed through the implementation of measures set out in the draft CoCP.

3.2.21 The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in Volume 4 of the main ES.

Effects during operation

3.2.22 There were no significant operational effects on cultural heritage reported in Volume 4 of the main ES. The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in Volume 4 of the main ES.

Ecology

Scope, assumptions and limitations

3.2.23 The assessment scope for ecology is as set out in Volume 1 of the SES and AP2 ES. The key assumptions and limitations, and the methodology for determining significance of effects are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/01) and the SMR Addendum (Volume 5: Appendix CT-001-000/02) of the main ES.

3.2.24 To address any limitations in data, a precautionary baseline has been considered according to the guidance reported in the main ES, Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst-case' basis for the subsequent assessment. The precautionary approach to the assessment that has been adopted identifies the likely significant ecological effects of the AP2 revised scheme

Baseline

3.2.25 The ecology baseline is unchanged from that detailed in the main ES, Volume 5, CT-007-00. The land required for the proposed amendment does not lie within any designated sites and the closest site is the Colwich Brickworks SBI, which is approximately 130m north of the revised crane platform location and associated access.

3.2.26 The majority of the land required for the proposed amendment is within an area of improved grassland used for stock grazing. This and the existing unpaved farm access track are considered to be of negligible value. The access route proposed also crosses a hedgerow and a line of semi-mature/mature trees; these are considered to be up to local/parish value.

Effects arising during construction

3.2.27 The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000 of the main ES), which includes translocation of protected species where appropriate. Temporary construction access routes will be routed to avoid hedgerows and mature trees wherever possible.

3.2.28 The main ES reported that the original scheme will result in the loss of habitats including: hedgerows, mature and semi-mature trees, poor semi-improved grassland, scrub, and tall ruderal vegetation, but that due to the relatively minor footprint of the original scheme and with avoidance measures in place, these losses are unlikely to have a significant adverse effect on the conservation status of these habitats.

3.2.29 The original location of the crane platform was within agricultural land given over to stock grazing. This is the same for the AP2 revised scheme. The access to the platform in the original scheme resulted in the loss of approximately 0.1ha of mature and semi-mature trees and scrub. This area of habitat is no longer lost for the AP2 revised scheme. The AP2 revised scheme will result in the loss of a short (less than 10m) length of hedgerow and similar length of mature and semi-mature trees that are located adjacent to the existing farm access track.

3.2.30 This does not result in any new or different effects to those reported in the main ES.

3.2.31 The main ES reported that the habitats present within the land required for the original scheme have the potential to support protected species, including great crested newt, reptiles, roosting bats, badgers and nesting birds. This is also the case for the land required for the proposed amendment. The assessment assumes implementation of the measures set out within the draft CoCP (Volume 5: Appendix CT-003-000), which includes translocation of protected species where appropriate.

3.2.32 The main ES reported that due to the relatively minor footprint of the original scheme and with avoidance measures in place, the impacts are unlikely to have an adverse effect on the conservation status of great crested newt, bats, reptiles, badgers or nesting birds and would not be significant.

3.2.33 Measures to avoid the potential killing, injury and disturbance of protected species including great crested newt, roosting bats, reptiles, badgers and nesting birds will be provided in accordance with the principles of ecological mitigation identified within the SMR Addendum (Volume 5: Appendix CT-001-000/2).

3.2.34 No additional mitigation measures (i.e. in addition to those identified in Volume 4 of the main ES) are required.

3.2.35 No new or different residual effects on ecological receptors occur as a consequence of the amendment. The significant residual effects of the AP2 revised scheme in this area are therefore unchanged from those reported in Volume 4 of the main ES.

Effects during operation

3.2.36 There were no significant operational effects on ecology reported in Volume 4 of the main ES. No new or different residual effects on ecological receptors occur as a consequence of the amendment. The significant residual effects of the AP2 revised scheme in this area are therefore unchanged from those reported in Volume 4 of the main ES.

Additional land for construction access east of Colwich for revised signal gantry location (AP2-000-004)

3.2.37 The Bill provides for land within the operational WCML to install a new signal gantry immediately to the west of the A51, as well as land required temporarily immediately to the south of the WCML for access to and construction of a crane platform to install the gantry (refer to main ES maps CT-06-147, E5 and CT-05-147, E6 in the Volume 4 Map Book). However, since submission of the Bill it has been identified that an alternative location for the signal gantry and therefore the associated construction crane platform is required, on the east side of the A51 (refer to maps CT-06-147, E5/F5, and CT-05-147, F5/F6 in the SES and AP2 ES Volume 4 Map Book). The alternative location is required due to operational railway signal sighting requirements.

3.2.38 This amendment does not change the construction methodology, programme and access requirements reported in Volume 4 of the main ES.

3.2.39 The operational original scheme reported in Volume 4 of the main ES is unchanged except for the repositioning of one signal gantry.

3.2.40 The temporary use of this additional land for access to and construction of a temporary crane platform is not considered to make changes that require a reassessment of the environmental effects or proposed mitigation as set out in the

main ES with respect to: agriculture, forestry and soils, air quality, community, ecology, land quality, landscape and visual assessment, socio-economics, sound, noise and vibration, traffic and transport and water resources and flood risk assessment. However, there are changes where reassessment is considered necessary for cultural heritage.

Cultural heritage

Baseline

3.2.41 The cultural heritage baseline is unchanged from that detailed in the main ES, Volume 5, CT-007-00 and summarised in paragraphs 5.3.8 and 5.3.9 of Volume 4 of the main ES. No designated heritage assets lie within the land required for the construction of the new access and crane platform.

Effects during construction

3.2.42 Paragraph 5.6.24 of Volume 4 of the main ES states that Colwich Church of England Primary School, a Grade II listed building (NHL1273481), is of moderate value, and located immediately south of the WCML. Due to the temporary nature of the crane platforms and given that the area will be returned to its original condition, the main ES concluded that there will be no significant effects on Colwich Church of England Primary School. This remains the case for the AP2 revised scheme, where one of the crane platforms that was in close proximity to the school will be moved further away, from the west to the east side of the A51.

3.2.43 As set out in Volume 5: Appendix CT-007-000, Section 5, of the main ES the construction of the scheme may result in permanent adverse impacts on currently unknown archaeological remains within the land required, temporarily and permanently. Potential impacts will be addressed through the implementation of measures set out in the draft CoCP.

3.2.44 The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in Volume 4 of the main ES.

Effects during operation

3.2.45 There were no significant operational effects on cultural heritage reported in Volume 4 of the main ES. The amendment will not give rise to a new or different significant effect and will not change the level of significance of the effects reported in Volume 4 of the main ES.

3.3 Summary of new or different likely residual significant effects

3.3.1 The amendments will not give rise to new or different likely significant residual effects for any topics as a result of the amendments to the modifications being undertaken to the WCML between Lichfield and Colwich, as set out in Volume 4 of the main ES.

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