

HIGH SPEED RAIL (LONDON - WEST MIDLANDS)

Supplementary Environmental Statement and Additional Provision 2 Environmental Statement

Volume 5 | Technical appendices

Off-route

July 2015

SES and AP2 ES 3.5.2



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This table shows the topics covered by the technical appendices in this volume, and the reference codes for them.

CFA name and number	Topic	Code
Heathrow Express Langley	Agriculture, forestry and soils	HEX-AG-001
	Air quality	HEX-AQ-001
	Cross Topic	HEX-CT-001
	Community	HEX-CM-001
	Cultural heritage	HEX-CH-001
		HEX-CH-002
		HEX-CH-003
	Ecology	HEX-EC-001
	Land Quality	HEX-LQ-001
	Landscape and visual assessment	HEX-LV-001
	Sound, noise and vibration	HEX-SV-001
		HEX-SV-002
		HEX-SV-003

SES and AP2 ES Appendix HEX-AG-001

Environmental topic:	Agriculture, forestry and soils	AG
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

1.1.1 The agriculture, forestry and soils appendix for the Supplementary Environmental Statement (SES) and the Additional Provision 2 Environmental Statement (AP2) Volume 4: off route effects comprises:

- soils and Agricultural Land Classification (ALC) surveys (Section 2);
- forestry (Section 3); and
- the assessment of effects on holdings (Section 4).

1.1.2 Maps referred to throughout the agriculture, forestry and soils appendix are contained in the Volume 5, Agriculture, Forestry and Soils Map Book.

2 Soils and agricultural land classification surveys

2.1 Background

2.1.1 The agricultural baseline data has been derived from both desk study and site investigation. Information gathered by the desk study has related primarily to the identification of soil resources in the study area, the associated physical characteristics of geology, topography and climate which underpin the assessment of agricultural land quality, and the disposition of land uses. The main sources of information have included:

- National Soil Map¹;
- Soils and Their Use in South East England²;
- solid and superficial deposits from the Geology of Britain viewer³;
- gridpoint meteorological data for Agricultural Land Classification of England and Wales⁴;
- Provisional Agricultural Land Classification of England and Wales (1:250,000)⁵;
- Likelihood of Best and Most Versatile Agricultural Land (1:250,000)⁶; and
- aerial photography.

¹ Cranfield University, (2001), *The National Soil Map of England and Wales* 1:250,000 scale.

² Soil Survey of England and Wales, (1984), *Soils and Their Use in South East England*.

³ British Geological Survey. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>: Accessed on 18 March 2013

⁴ Meteorological Office, (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*.

⁵ Ministry of Agriculture, Fisheries and Food (MAFF), (1983), *Agricultural Land Classification of England and Wales* (1:250,000).

⁶ Department for Environment, Food and Rural Affairs (Defra), (2005), *Likelihood of Best and Most Versatile Agricultural Land* (1:250,000).

2.2 Soils and land resources

- 2.2.1 This part of the technical appendix describes the findings of a desktop study that identify existing soil and agricultural land resources at and within a 2km radius of the proposed Heathrow Express (HEX) depot site. The location and extent of soil types displaying different characteristics and of agricultural land in the different ALC grades are influenced by topography, drainage, geology and soil parent material.

Topography and drainage

- 2.2.2 The depot site is largely level and sits at around 30m Above Ordnance Datum (AOD). The site is crossed by ditches in the centre and east, which run south to the railway.
- 2.2.3 Topography in the vicinity of the depot site continues to be largely level at 30m AOD with a gentle incline to the north-east to around 40m AOD. The main features in the area are the Grand Union Canal to the north of the site and the Great Western Railway to the south which are both aligned east-west.
- 2.2.4 Small pockets of woodland are present to the north and east of the study area.

Geology and soil parent materials

- 2.2.5 The London Clay bedrock extends throughout the 2km study radius. The superficial deposits of the Langley Silt Member are also common, present mostly to the north-east, south and north-west.
- 2.2.6 Riverine sand and gravel of the Taplow Gravel Formation is predominantly mapped to the west, whilst the Lynch Hill Gravel Member is found to the north and east, also comprising sand and gravel.

Description and distribution of soil types

- 2.2.7 The National Soil Map shows the proposed HEX depot site to be non-agricultural, bordering on Park Gate soils to the north and Hamble 2 soils to the south. Both associations 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.
- 2.2.8 The two associations continue to be mapped to the north and south of the site within the 2km study radius, with non-agricultural land to the east and west.

2.3 Soil and land use interactions

Agricultural land quality

- 2.3.1 Detailed post-1988 ALC data is available for two sites within 2km of the proposed HEX depot site. To the immediate south-east of the site there is agricultural land in Grade 1 and Subgrade 3a, whilst land to the north is of Grades 1 and 2, and Subgrades 3a and 3b.
- 2.3.2 There is, though, no detailed ALC data for the site and so a professional judgement is made as to the probable predominant ALC grade for a soil with the given characteristics found, under the applicable climatic conditions. The judgement is influenced by the surveyor's experience of previous surveys in the locality and on

similar soil types. The resulting grade is that which is considered to be the most likely grade that would be found should a detailed site investigation be conducted, although this does not mean in all cases that grade will be found in practice.

- 2.3.3 Firstly the context land quality information was derived from the provisional ALC maps of England and Wales, produced by the former Ministry of Agriculture, Fisheries and Food (MAFF) in the 1960s and 1970s. The provisional mapping shows the study area to be non-agricultural but bordering on Grade 1 (excellent quality) agricultural land. These maps were originally published at a scale of 1:63,360 and are available at a scale of 1:250,000 in paper and digital formats. The main limitations of these provisional maps are that they are published at strategic scales only and according to a soil classification methodology which has been revised twice since the maps were published. Therefore they cannot be used to definitively classify individual sites.
- 2.3.4 The principal physical factors influencing agricultural production and land quality are climate, site and soil, and the interactions between them.

Agro-climatic limitations

- 2.3.5 The local agro-climatic data have been interpolated from the Meteorological Office’s standard 5km grid point data set for the site, and are set out in Table 1. The data show the area to be warm with moderate rainfall. The number of Field Capacity Days (FCDs) is 139 which is lower than the average for lowland England and is favourable for providing opportunities for agricultural land working.

Table 1 : Local agro-climatic conditions

Climatic Parameter	West Ickenham	Climatic Parameter
Altitude (m AOD)	30	Altitude (m AOD)
Average Annual Rainfall	676mm	Average Annual Rainfall
Accumulated Temperature >0°C	1,483 day°	Accumulated Temperature >0°C
Field Capacity Days	139 days	Field Capacity Days
Average Moisture Deficit, wheat	117mm	Average Moisture Deficit, wheat
Average Moisture Deficit, potatoes	112mm	Average Moisture Deficit, potatoes

Site limitations

- 2.3.6 Site limitations considered within the ALC assessment typically relate to how topography affects the use of agricultural machinery. The primary factors assessed are gradient, microrelief and flood risk.
- 2.3.7 Agricultural land quality at the proposed HEx depot site is not limited by site factors.

Soil limitations

- 2.3.8 The main soil limitations which affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility.

Together they influence the functions of soil and affect water availability for crops, drainage, workability and trafficability.

- 2.3.9 There are two distinct soil characteristics within the 2km radius of the site which are the fine loamy textures to the north which are poorly permeable, and those that are freely draining to the south. Soil depth and chemical limitations are not encountered.

Interactive limitations

- 2.3.10 The physical limitations which result from interactions between climate, site and soil are soil wetness, droughtiness and susceptibility to erosion. Each soil can be allocated a Wetness Class based on soil structure, evidence of waterlogging and the number of Field Capacity Days. The topsoil texture then determines the ALC grade according to Table 6 of the MAFF ALC guidelines⁷ (Figure 1).
- 2.3.11 In this area the deep, aeolian, fine loamy or silty Park Gate association soils are moderately to poorly permeable and moderately to poorly drained (soil wetness class (WC) III or IV). Under an FCD regime of 139 days, these soils with silty clay loam topsoil textures of WC III or IV are assessed as Subgrade 3a or 3b. The freely draining Hamble 2 soils are of WC I, which with silt loam or silty clay loam topsoil textures under the climatic conditions of the site, results in a minor wetness and workability limitation to Grade 1 or 2.
- 2.3.12 As the proposed HEx depot site is mapped as non-agricultural land, it is unknown whether the soils present will be more characteristic of the Park Gate or Hamble 2 soils though it is most likely that the adjacent agricultural land will be of best and most versatile (BMV) quality. Given that the easternmost ditch of the depot site also traverses through land of Subgrade 3a quality to the immediate south-east, suggests a greater likelihood that this land is also of Subgrade 3a.

⁷ MAFF (1988), *Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land.*

Figure 1 : ALC grade according to soil wetness (MAFF, 1988)

Wetness Class	Texture ¹ of the top 25 cm	Field Capacity Days				
		<126	126-150	151-175	176-225	>225
I	S ² LS ³ SL SZL	1	1	1	1	2
	ZL MZCL MCL SCL	1	1	1	2	3a
	HZCL HCL	2	2	2	3a	3b
	SC ZC C	3a(2)	3a(2)	3a	3b	3b
II	S ² LS ³ SL SZL	1	1	1	2	3a
	ZL MZCL MCL SCL	2	2	2	3a	3b
	HZCL HCL	3a(2)	3a(2)	3a	3a	3b
	SC ZC C	3a(2)	3b(3a)	3b	3b	3b
III	S ² LS SL SZL	2	2	2	3a	3b
	ZL MZCL MCL SCL	3a(2)	3a(2)	3a	3a	3b
	HZCL HCL	3b(3a)	3b(3a)	3b	3b	4
	SC ZC C	3b(3a)	3b(3a)	3b	4	4
IV	S ² LS SL SZL	3a	3a	3a	3b	3b
	ZL MZCL MCL SCL	3b	3b	3b	3b	3b
	HZCL HCL	3b	3b	3b	4	4
	SC ZC C	3b	3b	3b	4	5
V	S LS SL SZL	4	4	4	4	4
	ZL MZCL MCL SCL	4	4	4	4	4
	HZCL HCL	4	4	4	4	4
	SC ZC C	4	4	4	5	5
Soils in Wetness Class VI - Grade 5						

¹For naturally calcareous soils with more than 1% CaCO₃ and between 18% and 50% clay in the top 25 cm, the grade, where different from that of other soils, is shown *in brackets*

² Sand is not eligible for Grades 1, 2 or 3a

³ Loamy sand is not eligible for Grade 1

3 Forestry

- 3.1.1 Assessment of forestry resources has primarily had regard to the Forestry Inventory⁸.
- 3.1.2 The area of land under forestry (i.e. trees and woodland) within a 2km radius of the proposed HEx depot has been derived using Geographic Information System (GIS). The total area of woodland and the proportion affected by construction are given in Table 2.
- 3.1.3 Forestry resources are relatively sparse in the study area with the largest block of woodland located to the north at Langley Park.

Table 2 : Area of woodland within a 2km study area of the proposed HEx depot

Holding reference, name and description	Area of forestry land (ha)	Area of forestry land within 2km-radius study area (%)
Total forestry land in HEx study area	66	5% (forestry land use within 2km radius study area)
Total forestry land in Consolidated Construction Boundary	4.6	Approximately 11% of the land required for the construction of the Proposed Scheme is presently wooded

4 Assessment of effects on holdings

- 4.1.1 The assessment uses the same methodology set out in the Scope and Methodology Report (SMR) (Volume 5, Appendix CT-001-000/1) and the SMR Addendum (Volume 5, Appendix CT-001- 000/2).
- 4.1.2 The nature of impacts comprises the temporary and permanent land required from the holding, any temporary and/or permanent severance of land, the permanent loss of key farm infrastructure, and the imposition of disruptive effects (particularly noise and dust) on land uses and the holding's operations. These impacts occur primarily during the construction phase of the AP2 revised scheme and are set out in Table 3.

Table 3 : Summary of assessment of effected holding

Holding reference, name and description	Construction effects	Residual effects post restoration of land required temporarily
HEx/1 Berkyn Manor Farm* 1,600ha Medium sensitivity to change	Land required: 10.9ha; <1% of holding. Negligible impact Severance: None. Access maintained to land south and east of traveller site during construction. Negligible impact Disruptive effects: no impact on agricultural activity: construction dust and noise controlled via the mitigation measures set out within the draft Code	Land required: 6.0ha; <1% of holding. Negligible impact Severance: none. Negligible impact Infrastructure: No demolition and no other farm infrastructure affected. Negligible impact

⁸ Forestry Commission (2001), *National Forest Inventory Woodland and Ancient Woodland* (as updated).

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Holding reference, name and description	Construction effects	Residual effects post restoration of land required temporarily
	of Construction Practice. Negligible impact	
	Overall temporary assessment: negligible effect	Overall permanent assessment: negligible effect

* No Farm Impact Assessment interview conducted; data estimated.

5 References

Cranfield University, (2001), The National Soil Map of England and Wales 1:250,000 scale.

British Geological Survey. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>: Accessed on 18 March 2013

Department for Environment, Food and Rural Affairs (Defra), (2005), Likelihood of Best and Most Versatile Agricultural Land (1:250,000).

Forestry Commission (2001), National Forest Inventory Woodland and Ancient Woodland (as updated).

MAFF (1988), Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land.

Meteorological Office, (1989), Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations.

Ministry of Agriculture, Fisheries and Food (MAFF), (1983), Agricultural Land Classification of England and Wales (1:250,000).

Soil Survey of England and Wales, (1984), Soils and Their Use in South East England.

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Environmental topic:	Air quality	AQ
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

- 1.1.1 The air quality appendix for the proposed Heathrow Express (HEX) depot comprises:
- discussion of the policy framework (Section 2);
 - baseline air quality data (Section 3);
 - dust impact evaluation and risk rating (Section 4); and
 - air quality assessment - road traffic (Section 5).
- 1.1.2 Maps referred to throughout the air quality appendix are contained in the Volume 5, Air Quality Map Book.

2 Policy framework

- 2.1.1 There are no saved policies from the Slough Local Plan¹ relating to air quality. Policies 7 and 8 of the Slough Borough Council (SBC) Core Strategy² seek to achieve good standards of amenity and to prevent unacceptable levels of air pollution from new development and mitigate impacts on areas with existing poor air quality.

3 Baseline air quality data

3.1 Existing air quality

Local authority review and assessment information

- 3.1.1 SBC and South Bucks District Council (SBDC) carry out monitoring within their areas in order to help with assessing air quality and to identify any areas where air pollution is close to or already exceeding air quality standards.
- 3.1.2 As part of its review and assessment process, Slough Borough Council has declared air quality management areas (AQMA) for exceedances of the annual mean nitrogen dioxide (NO₂) standard at four roadside locations within Slough. These are outside the study area.
- 3.1.3 SBC's review and assessment process has identified that the district meets the standards for air quality in the majority of areas. In 2012, SBC designated two AQMAs at Tins Lane and in the town centre on the A4 Bath Road. These AQMAs are both outside the study area.
- 3.1.4 SBDC has declared an AQMA across an area encompassing the M4, M25 and M40 for exceedances of the annual mean NO₂ standard. The South Bucks AQMA lies 800m east of the site boundary, along the M25.
- 3.1.5 Local authority review and assessment information indicates that baseline concentrations of NO₂ and particulate matter as PM₁₀ and PM_{2.5} in the study area are likely to be in compliance with air quality standards, given low background concentrations across the district, although higher concentrations will occur in built-up areas.

¹ Slough Borough Council. 2004. Local Plan.

² Slough Borough Council. 2008. Slough Borough Core Strategy 2006-2026. Slough Local Development Framework.

Local air quality monitoring data

3.1.6 The pollutant concentrations can be compared to the air quality standards:

- $40\mu\text{g}/\text{m}^3$ as an annual mean for NO_2 and PM_{10} ;
- $200\mu\text{g}/\text{m}^3$ one-hour mean for NO_2 not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
- $50\mu\text{g}/\text{m}^3$ 24-hour mean for PM_{10} not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
- $25\mu\text{g}/\text{m}^3$ as an annual mean for $\text{PM}_{2.5}$.

Continuous monitoring

3.1.7 This section summarises the results from the continuous monitoring sites that are considered relevant for the assessment of air quality in this study area.

Table 1: Annual mean pollutant concentrations recorded at continuous monitoring sites³

Pollutant	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)				
	2008	2009	2010	2011	2012
SBC - Colnbrook (503551, 177258)					
NO_2	30.6	29.3	29.5	30.1	29.5
PM_{10}	21.3 ⁴	20.5	18.6	19.3	19.7
SBC - Lakeside 2 (521619, 183554)					
NO_2	36.3	35.0	38.8	34.8	31.1
PM_{10}	25.4	23.1	18.2	24.9	19.7
SBC - Chalvey (496670, 179058)					
NO_2	43.8	40.7	41.9	44.2	39.3
SBC - Town Centre A4 (496710, 180104)					
NO_2	38.6	34.0	32.5	35.2	37.1
PM_{10}	24.8	22.9	19.4	21.9	20.6
SBC - Lakeside 1 (Osiris⁵) (503662, 177207)					
PM_{10}	30.4	30.4	36.0	39.0	31.7
SBC - Colnbrook (Osiris) (503655, 176767)					
PM_{10}	24.7	28.3	21.8	39.5	27.7

³ Ricardo-AEA, www.airqualityengland.co.uk, Accessed: March 2015.

⁴ Concentrations calculated from www.airqualityengland.co.uk data differ from those in Slough Borough Council Progress Report 2014.

⁵ Osiris monitoring is not equivalent to the EU reference standard and is therefore indicative only.

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Pollutant	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)				
	2008	2009	2010	2011	2012
SBC - Lakeside 2 (Osiris) (504060, 177598)					
PM ₁₀	19.1	42.2	18.6	37.5	21.3

Table 2: Number of hours when hourly mean NO₂ concentrations exceed 200 $\mu\text{g}/\text{m}^3$ at continuous monitoring sites^{6,7}

Site	Number of exceedances of hourly mean NO ₂ standard				
	2008	2009	2010	2011	2012
SBC - Colnbrook (503551, 177258)	0	0	0 (103)	0	0
SBC - Lakeside 2 (503569, 177385)	0	0	0 (124)	0	0
SBC - Chalvey (496670, 179058)	13	1 (127)	1 (128)	0 (132)	2
SBC - Town Centre A4 (496710, 180104)	0 (109)	0	0	0	0

Table 3: Number of days when daily mean PM₁₀ concentrations exceed 50 $\mu\text{g}/\text{m}^3$ at continuous monitoring sites⁸

Site	Number of exceedances of daily mean PM ₁₀ standard				
	2008	2009	2010	2011	2012
SBC - Colnbrook (503551, 177258)	9	1	0 (28)	0	4 (30)
SBC - Lakeside 2 (503569, 177385)	21	17	1 (28)	16 (44)	14 (37)
SBC - Town Centre A4 (496710, 180104)	4 (37)	4 (35)	0	0	1
SBC - Lakeside 1 (Osiris) (503662, 177207)	20 (45)	16 (44)	62	80	38 (55)
SBC - Colnbrook (Osiris) (503655, 176767)	10 (35)	14	5	82	27
SBC - Lakeside 2 (Osiris) (504060, 177598)	3 (35)	18 (51)	4 (32)	57 (74)	3 (34)

Diffusion tubes

3.1.8 This section summarises the results from the diffusion tube sites that are considered relevant for the assessment of air quality in this study area.

Table 4: Annual mean NO₂ concentrations recorded at diffusion tube monitoring sites

Site	Ordnance Survey coordinates	Annual mean NO ₂ concentrations ($\mu\text{g}/\text{m}^3$)				
		2008	2009	2010	2011	2012
SBC - Brands Hill (A)	501798, 177659	58.0	57.9	67.0	61.2	66.7
SBC - Brands Hill (B)	501853, 177620	No data	No data	No data	No data	49.1

⁶ 99.8th percentile of hourly mean NO₂ concentrations in brackets ($\mu\text{g}/\text{m}^3$).

⁷ Ricardo-AEA, www.airqualityengland.co.uk, Accessed: March 2015.

⁸ 90.4th percentile of daily mean PM₁₀ concentrations in brackets ($\mu\text{g}/\text{m}^3$)

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Site	Ordnance Survey coordinates	Annual mean NO ₂ concentrations (µg/m ³)				
		2008	2009	2010	2011	2012
SBC - Colnbrook Bypass	503196, 177349	39.0	39.5	42.3	39.2	42.1
SBC - Ditton Road	500851, 177890	39.0	38.6	40.9	40.5	41.0
SBC - Grampian Way	501382, 178101	41.0	42.1	42.3	48.1	45.1
SBC - Lakeside Road	503877, 177459	39.0	35.3	39.7	43.4	45.5
SBC - London Road (A)	501733, 177725	47.0	48.9	59.1	49.0	54.8
SBC - London Road (B)	501734, 177733	No data	No data	No data	No data	36.6
SBC - London Road(C)	501658, 177781	No data	No data	No data	No data	42.0
SBC - Rogans (Colnbrook Bypass)	501941, 177633	45.0	46.2	54.7	51.1	55.4
SBC - Torridge Road	501637, 177999	38.0	36.6	47.4	41.2	39.5
SBC - Tweed Road	501518, 177882	37.0	36.4	41.2	38.1	42.0
SBDC - Iver, Old Slade Lane	503679, 178566	34.8	37.3	35.4	33.4	Data not available during assessment
SBDC - Iver, Victoria Crescent	504056, 180901	36.0	33.6	39.1	34.8	Data not available during assessment
SBDC - Iver, High Street	503688, 181229	33.3	38.3	36.9	33.7	Data not available during assessment

Background pollutant concentrations

- 3.1.9 Estimates of background air quality have been taken from the Department for Environment, Food and Rural Affairs (Defra) maps⁹. Background annual average NO₂ concentrations are within the air quality standard of 40µg/m³ throughout the study area, with annual mean concentrations in the range 20.5µg/m³ - 32.5µg/m³ in 2012. Background annual average PM₁₀ concentrations are within the air quality standard of 40µg/m³ throughout the area, with annual mean concentrations in the range 18.8µg/m³ - 24.5µg/m³ in 2012.

Local emission sources

⁹ Defra; Background Pollutant Concentration Maps; <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>; Accessed: 2012.

- 3.1.10 The main source of pollution in the study area is road vehicles. Major roads include the M25, M4 and the A412.

3.2 Receptors

Human

Construction phase

- 3.2.1 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 include properties at the caravan site on Mansion Lane, Market Lane, Maplin Park and Mead Avenue. Further 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. Receptors at greatest risk of dust effects are indicated in Maps AQ-01-HEX and AQ-02-HEX (Volume 5, Air Quality Map Book).

Operational phase

- 3.2.2 Once operational, only receptors located on roads where the new diversion is required have the potential to be affected. These are limited to receptors on Mansion Lane and Market Lane.

Ecological

Construction phase

- 3.2.3 There are no ecological receptors within 50m of the site boundary therefore, ecological receptors have not been considered in the construction dust assessment.

Operational phase

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

4 Dust impact evaluation and risk rating

- 4.1.1 The following sections provide details of the assessment of construction impacts following the Institute of Air Quality Management (IAQM) guidance¹⁰. Where considered useful to identify receptors and their relationship to the construction activity, a specific figure is provided and referenced. On-site haul movements were assessed explicitly.
- 4.1.2 The dust assessment criteria for the haul route are based on those for earthworks, as set out in the IAQM guidance. This emission phase was considered to be the most applicable, as the assessment of impacts from earthworks will depend, in part, on the passage of vehicles over open surfaces. It was assumed that significant effects would not occur beyond a distance of 50m from the haul route, again based on interpretation of the earthworks criteria, and that all areas of the haul route will be

¹⁰ IAQM, (2014), Guidance on the assessment of dust from demolition and construction.

subject to more than 10 vehicle movements per day. On the basis of criteria for earthworks within the IAQM guidance, the dust emission class for the haul route is large. Wherever there are receptors within 50m of a haul route, the sensitivity of the receiving environment was derived using the IAQM guidance. The need for, and capability of, the local environmental management plan (LEMP) to control these dust emissions, as directed by the draft Code of Construction Practice¹¹ (CoCP), was then considered in forming the conclusion of the assessment.

¹¹ Main ES, Volume 5: Appendix CT-003-000.

Table 5: Evaluation and risk rating of construction activities

Activity	Distance to nearest receptor	Dust emission class (1)	Sensitivity of surrounding area (dust soiling effects) (2)	Sensitivity of surrounding area (health effects) (2,3)	Dust risk category (dust soiling effects)	Dust risk category (health effects)	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
HEX depot site (Langley) (Map AQ-02-HEX (Volume 5, Air Quality Map Book))								
Demolition	Greater than 150m	Small	Low	Low	Low risk	Low risk	Negligible	<ol style="list-style-type: none"> 1. Building volume less than 20,000m³ Potentially dusty construction material (concrete) 2. No receptors within 100m of activities 3. Background PM₁₀ concentrations less than 24µg/m³
Earthworks	Less than 20m	Large	Large	High	High risk	High risk	Slight adverse	<ol style="list-style-type: none"> 1. Area greater than 10,000m² involved in earthworks 2. Densely populated area, 10 - 100 dwellings within 20m of site 3. Background PM₁₀ concentrations less than 24µg/m³
Construction	Less than 20m	Medium	High	High	Medium risk	Medium risk	Slight adverse	<ol style="list-style-type: none"> 1. Less than 25,000m³ building material volume Potentially dusty construction material (ready-mix concrete) 2. Densely populated area, 10 - 100 dwellings

								within 20m of site 3. Background PM ₁₀ concentrations less than 24µg/m ³
Trackout	Less than 20m	Large	High	High	High risk	High risk	Slight adverse	1. More than 50 heavy goods vehicles (HGVs) per day 2. Densely populated area, 10 - 100 dwellings within 20m of site 3. Background PM ₁₀ concentrations less than 24µg/m ³
Haul routes	Less than 50m	Large	High	High	High risk	High risk	Slight adverse	1. More than 50 heavy goods vehicles (HGV) per day Site greater than 10,000m ² Potentially dusty soil type 2. Densely populated area, 10 - 100 dwellings within 20m of site 3. Background PM ₁₀ concentrations less than 24µg/m ³

Table 6: Summary of construction dust impacts and effects

Location	Magnitude of impact	Effect of dust-generating activities	Additional mitigation
HEx depot site (Langley)	Slight adverse	Not significant	None required

5 Air quality assessment - road traffic

5.1 Overall assessment approach

- 5.1.1 The air quality assessment for road-related emissions has considered the use of three possible different approaches based on the scale of changes in traffic and road alignment. Where the Design Manual for Roads and Bridges¹² (DMRB) thresholds detailed in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1) are not exceeded, no additional assessment is required, as the air quality impacts will be minimal. If these thresholds are breached, then a quantitative assessment is carried out
- 5.1.2 Where the road configuration is straightforward, the DMRB screening method has been used to predict changes in air quality. Where the road layout is considered to be complex or where the use of the DMRB screening method indicates that there will be a potential exceedance of air quality standards, the atmospheric dispersion model ADMS-Roads is used for the assessment. Professional judgment is used to select the appropriate tool.
- 5.1.3 In this study area, the DMRB screening method is the most appropriate and has been used for the assessment.

5.2 Construction traffic model

- 5.2.1 Roads assessed for construction traffic are detailed in Volume 5: Appendix TR-001-000 and include the new diversion. Scenarios assessed correspond to the peak phase of construction.

Receptors assessed

- 5.2.2 For all road links where DMRB criteria for assessing local air quality were met due to increased traffic flows, a number of receptors representative of worst-case exposure locations were selected for assessment. These included locations representative of highest pollutant concentrations along the roads, including closest to junctions or to the road itself.
- 5.2.3 Receptors assessed are presented in Table 7 and in Map AQ-01-HEx (Volume 5, Air Quality Map Book).

¹² Highways Agency, (2007), *The Design Manual for Roads and Bridges, (Volume 11, Section 3, Part 1 Air Quality HA207/07)*.

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Table 7: Modelled receptors (construction phase)

Receptor	Description/location	Ordnance Survey coordinates
1	Somerset Way	504018, 179453
2	Tower Arms Public House	504054, 179468
3	40 Thorney Lane North	503942, 180643
4	25 Thorney lane North	503962, 180855
5	1 Thorney lane North	503911, 181172
6	Ivory House, 74 Iver High St	503655, 181258
7	Evreham Road	503528, 181440
8	Iver Food and Wine, Bangor Road South	503616, 181258
9	Iver County First School	503589, 181233
10	Coopins, Bangor Road South	503390, 181796
11	Callingwood Cottage, Bangor Road South	503182, 182011
12	Stoke Cottages, Bangor Road South	503065, 182329
13	Needwood Cottages, Bangor Road South	503130, 182808
14	Property Bangor Road South and Slough Road	503065, 183010
15	Black Horse Public House	503038, 183075
16	Kingcup Farm	503670, 185111
17	Moat Place	504529, 185584

Background concentrations

5.2.4 The background concentrations used in the DMRB assessment are shown in Table 8 and Table 9 taken from the Defra maps.

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Table 8: Background 2012 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations ($\mu\text{g}/\text{m}^3$)		
	NO _x	NO ₂	PM ₁₀
(1) Somerset Way	73.6	41.6	23.4
(2) Tower Arms Public House	73.6	41.6	23.4
(3) 40 Thorney Lane North	44.7	27.5	20.3
(4) 25 Thorney lane North	44.7	27.5	20.3
(5) 1 Thorney lane North	39.3	24.9	19.8
(6) Ivory House, 74 Iver High St	39.3	24.9	19.8
(7) Evreham Road	39.3	24.9	19.8
(8) Iver Food and Wine, Bangor Road South	39.3	24.9	19.8
(9) Iver County First School	39.3	24.9	19.8
(10) Coopins, Bangor Road South	39.3	24.9	19.8
(11) Callingwood Cottage, Bangor Road South	36.9	23.7	19.5
(12) Stoke Cottages, Bangor Road South	36.9	23.7	19.5
(13) Needwood Cottages, Bangor Road South	36.9	23.7	19.5
(14) Property Bangor Road South and Slough Road	49.6	30.5	22.1
(15) Black Horse Public House	49.6	30.5	22.1
(16) Kingcup Farm	46.2	28.8	21.9
(17) Moat Place	46.7	29.0	22.3

Table 9: Background 2017 concentrations at assessed receptors

Receptor (or zone of receptors)	Concentrations ($\mu\text{g}/\text{m}^3$)		
	NO _x	NO ₂	PM ₁₀
(1) Somerset Way	62.1	36.7	21.6
(2) Tower Arms Public House	62.1	36.7	21.6
(3) 40 Thorney Lane North	38.8	24.6	18.9

Receptor (or zone of receptors)	Concentrations ($\mu\text{g}/\text{m}^3$)		
	NO _x	NO ₂	PM ₁₀
(4) 25 Thorney lane North	38.8	24.6	18.9
(5) 1 Thorney lane North	34.2	22.3	18.6
(6) Ivory House, 74 Iver High St	34.2	22.3	18.6
(7) Evreham Road	34.2	22.3	18.6
(8) Iver Food and Wine, Bangor Road South	34.2	22.3	18.6
(9) Iver County First School	34.2	22.3	18.6
(10) Coopins, Bangor Road South	34.2	22.3	18.6
(11) Callingwood Cottage, Bangor Road South	32.0	21.1	18.3
(12) Stoke Cottages, Bangor Road South	32.0	21.1	18.3
(13) Needwood Cottages, Bangor Road South	32.0	21.1	18.3
(14) Property Bangor Road South and Slough Road	42.2	26.9	20.6
(15) Black Horse Public House	42.2	26.9	20.6
(16) Kingcup Farm	39.1	25.3	20.5
(17) Moat Place	39.2	25.3	20.8

Design Manual for Roads and Bridges model results

5.2.5 This section provides the summary of the modelled pollutant concentrations for the assessed receptors. The magnitude of change and impact descriptor are also derived following the Environmental Protection UK (EPUK) methodology¹³.

¹³ Environmental Protection UK (EPUK), (2010), *Development Control: Planning for Air Quality*.

Table 10: Summary of DMRB annual mean NO₂ results (construction phase)

Receptor	NO ₂ concentrations (µg/m ³)			Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without proposed HEx Depot	2017 with proposed HEx Depot			
1	50.6	43.3	43.8	0.5	Small	Slight adverse
2	57.3	48.5	49.3	0.8	Small	Slight adverse
3	45.0	37.6	38.4	0.8	Small	Slight adverse
4	39.7	33.5	34.1	0.6	Small	Negligible
5	43.2	35.8	36.7	0.9	Small	Slight adverse
6	29.2	24.9	25.4	0.5	Small	Negligible
7	28.4	24.4	24.8	0.4	Imperceptible	Negligible
8	31.1	26.1	26.8	0.7	Small	Negligible
9	27.7	24.0	24.3	0.3	Imperceptible	Negligible
10	31.7	26.5	27.3	0.8	Small	Negligible
11	29.6	24.7	25.4	0.7	Small	Negligible
12	30.4	25.2	26.0	0.8	Small	Negligible
13	29.9	24.9	25.6	0.7	Small	Negligible
14	35.0	29.7	30.2	0.5	Small	Negligible

Receptor	NO ₂ concentrations (µg/m ³)			Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without proposed HEx Depot	2017 with proposed HEx Depot			
15	32.6	28.2	28.4	0.2	Imperceptible	Negligible
16	29.1	25.5	25.5	0.0	Imperceptible	Negligible
17	29.2	25.4	25.4	0.0	Imperceptible	Negligible

Table 11: Summary of DMRB annual mean PM₁₀ results (construction phase)

Receptor	PM ₁₀ concentrations (µg/m ³)			Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without proposed HEx Depot	2017 with proposed HEx Depot			
1	25.3	23.2	23.3	0.1	Imperceptible	Negligible
2	27.0	24.6	24.7	0.1	Imperceptible	Negligible
3	23.9	21.9	22.1	0.1	Imperceptible	Negligible
4	22.7	20.9	21.0	0.1	Imperceptible	Negligible
5	23.5	21.7	21.9	0.1	Imperceptible	Negligible
6	20.5	19.2	19.2	0.1	Imperceptible	Negligible
7	20.4	19.1	19.1	0.1	Imperceptible	Negligible
8	20.9	19.4	19.5	0.1	Imperceptible	Negligible
9	20.3	19.0	19.0	0.0	Imperceptible	Negligible

Receptor	PM ₁₀ concentrations (µg/m ³)			Change in concentrations (µg/m ³)	Magnitude of change	Impact descriptor
	2012 baseline	2017 without proposed HEx Depot	2017 with proposed HEx Depot			
10	21.0	19.5	19.6	0.1	Imperceptible	Negligible
11	20.5	19.1	19.2	0.1	Imperceptible	Negligible
12	20.6	19.2	19.3	0.1	Imperceptible	Negligible
13	20.5	19.1	19.2	0.1	Imperceptible	Negligible
14	22.9	21.2	21.3	0.1	Imperceptible	Negligible
15	22.5	20.9	20.9	0.0	Imperceptible	Negligible
16	21.9	20.5	20.5	0.0	Imperceptible	Negligible
17	22.3	20.8	20.8	0.0	Imperceptible	Negligible

Table 12: Summary of DMRB-Roads 24-hour mean PM₁₀ results (construction phase)

Receptor	Number of days exceeding PM ₁₀ 24-hour standard			Change in days	Magnitude of change	Impact descriptor
	2012 baseline	2017 without proposed HEx Depot	2017 with proposed HEx Depot			
1	13.2	8.5	8.6	0.1	Imperceptible	Negligible
2	17.6	11.4	11.7	0.3	Imperceptible	Negligible
3	10.0	6.2	6.4	0.2	Imperceptible	Negligible
4	7.6	4.6	4.7	0.1	Imperceptible	Negligible

Receptor	Number of days exceeding PM ₁₀ 24-hour standard			Change in days	Magnitude of change	Impact descriptor
	2012 baseline	2017 without proposed HEx Depot	2017 with proposed HEx Depot			
5	9.2	5.9	6.1	0.2	Imperceptible	Negligible
6	4.1	2.5	2.5	0.1	Imperceptible	Negligible
7	3.9	2.3	2.4	0.1	Imperceptible	Negligible
8	4.5	2.7	2.8	0.1	Imperceptible	Negligible
9	3.7	2.2	2.3	0.0	Imperceptible	Negligible
10	4.7	2.8	2.9	0.1	Imperceptible	Negligible
11	4.0	2.4	2.5	0.1	Imperceptible	Negligible
12	4.2	2.5	2.6	0.1	Imperceptible	Negligible
13	4.1	2.4	2.5	0.1	Imperceptible	Negligible
14	7.9	5.1	5.2	0.1	Imperceptible	Negligible
15	7.1	4.6	4.6	0.0	Imperceptible	Negligible
16	6.2	4.1	4.1	0.0	Imperceptible	Negligible
17	6.9	4.5	4.5	0.0	Imperceptible	Negligible

Assessment of significance

- 5.2.6 The significance of the impacts on air quality from construction traffic associated with the proposed HEx Depot has been assessed in accordance with the EPUK methodology. AQMAs are present in Slough along major transport corridors, and pollution levels exceed air quality standards in many locations, particularly along major roads.
- 5.2.7 The DMRB assessment found negligible and slight adverse impacts as a result of construction traffic, which will not give rise to significant effects.

5.3 Operational traffic model

- 5.3.1 Operational traffic data used in this assessment are detailed in Volume 5: Appendix TR-001-000. The scenario assessed is based on maximum traffic on affected roads during the opening year of the proposed HEx Depot. No roads met the criteria for assessment.

6 References

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SES and AP2 ES Appendix HEX-CT-001

Environmental topic:	Cross Topic	CT
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Committed Developments

- 1.1.1 Table 1 lists unimplemented committed development (either approved consents or allocations in adopted local plans and non-statutory plans) identified as of 28 February 2015.
- 1.1.2 The committed developments listed are those where the potential for environmental effects may occur. Committed development is considered within the environmental assessment where it is material to the environmental impact of the proposed Heathrow Express (Hex) depot. Those highlighted in green are potential cumulative developments, anticipated to be implemented after 2017. The location of these developments is shown on map series CT-13 (Volume 5, Cross Topic Map Book).

Table 1: Committed Development as of 28 February 2015

Reference identification (ID)	Local planning authority (LPA) and planning reference	Type (permission or allocation)	Description	Site address	Applicant	Comment
Langley/1	South Bucks District Council 14/01362/FUL	Application	Redevelopment of site to provide a six unit building for mixed uses including B1, B2 and B8 with associated parking.	29 The Ridgeway, Iver, Buckinghamshire, SLo 9JE	Mr A Lal	Amendment to planning permission 05/01369/FUL
Langley/2	South Bucks District Council 14/00414/FUL	Application	Mixed use of land for the keeping of horses and the stationing of two mobile homes for residential purposes as two gypsy pitches incorporating hard surfacing and ancillary works.	Land Adjacent to Thorney Lane, North Iver, Buckinghamshire	Mr & Mrs A Davies	
Langley/3	Buckinghamshire County Council 10/00739/CM	Application	Lawful Development Certificate for the deposition of material including inert waste material prior to loading onto rail wagons, subsequent loading and unloading by rail.	Thorney Mill Sidings, Thorney Mill Road, Iver, Buckinghamshire. UB7 7EZ	D B Schenker Rail (UK) Limited	
Langley/4	Buckinghamshire County Council CC/07/11	Application	Demolition of existing school dining room and music room. Erection of new dining room and hub kitchen and extension of existing car park to provide 14 additional car parking spaces.	Iver Village Junior School, High Street, Iver, Buckinghamshire, SLo 9QA	Buckinghamshire County Council	
Langley/5	Spelthorne District Council SP/13/00141/SCC	Application	Extraction of sand and gravel from land at Homers Farm together with associated wheelwash, site office, cabin for generator and car parking, the provision of a new access from Short Lane, restoration involving the importation of inert restoration materials to agriculture, on a site of 10.5 hectares.	Homers Farm, London Road (A30), Staines	Surrey County Council	
Langley/6	Buckinghamshire County Council	Application	Extension of the existing gas control compound to accommodate the installation of a new landfill gas utilisation engine and associated	Land at Thorney Farm, Thorney Mill Road, Iver, Buckinghamshire,	Buckinghamshire County Council	

Reference identification (ID)	Local planning authority (LPA) and planning reference	Type (permission or allocation)	Description	Site address	Applicant	Comment
	11/01414/CM		plant and equipment.	SL0 9AL		
Langley/7	Buckinghamshire County Council 13/00575/CC	Application	Extraction of mineral, mineral processing including bagging, infilling with construction and demolition waste together with restoration to agriculture and nature conservation uses.	Land adjacent to Uxbridge Road, George Green, Slough, SL2 5NH	Brett Aggregates Ltd	
Langley/8	London Borough of Hillingdon 13226/APP/2012/2185	Application	Redevelopment of the site to provide an aggregate recycling and processing plant, asphalt plant and storage facility, gully waste recycling plant, aggregate storage facility, and term maintenance depot, with ancillary offices, structures and facilities, car and lorry parking, regrading, and landscaping.	Former Powergen Site, North Hyde Gardens, Hayes, UB3 4QR	F M Conway Ltd	
Langley/9	South Bucks District Council South Iver Opportunity Area	Allocation	Employment Allocation - The Court Lane site is identified on the Proposals Map as a Major Developed Site in the Green Belt.	Court Lane Industrial Area, Iver, Buckinghamshire, SL09	n/a	
Langley/10	Slough Borough Council SSA22	Allocation	Mixed use allocation - comprising a minimum of 123 dwellings and a health centre.	BT site and 297 Langley Road, Slough, SL3 7	n/a	
Langley/11	Slough Borough Council SSA23	Allocation	Retail allocation - Supermarket with a maximum floorspace of 2,500 m2	11/49 Station Road, Slough, SL3 8	n/a	
Langley/12	Slough Borough Council LP18 (Policy H2)	Allocation	Housing allocation – 2.9 hectare site identified for residential development.	Middlegreen Trading Estate, Middlegreen	n/a	

Reference identification (ID)	Local planning authority (LPA) and planning reference	Type (permission or allocation)	Description	Site address	Applicant	Comment
				Road, Slough, SL3 6		
Langley/13	Slough Borough Council SKLo4	Allocation	Mixed use allocation – for predominantly residential use.	Former Langley Oil Terminal and Railway Station Car Park, Canal Wharf, Slough, SLo 9	n/a	Assumed not to be implemented by reason of being considered unviable given site is within an area of land required for the HS2 scheme.
Langley/14	Buckinghamshire County Council CS14	Allocation	Waste allocation – site allocated as having potential for a rail waste transfer facility.	Richings Park, Hollow Hill Lane, Iver, Buckinghamshire	n/a	
Langley/15	Berkshire County Council SMo2	Allocation	Preferred Area for Gravel extraction	Farmland to the west of the Iver STW, south of the M4	n/a	
Langley/16	Berkshire County Council CS7 and CS14	Allocation	Safeguarding of existing rail aggregates depot and allocation for potential for rail waste transfer facility.	Thorney Mill, Iver, Buckinghamshire	n/a	
Langley/17	TfL Crossrail 1	Hybrid Bill Application	Crossrail- A new rail line passing through London from Maidenhead in the west to Shenfield in the east.	Crossrail east to west London rail from Maidenhead to Shenfield	TfL	
Langley/18	Slough Borough Council M4 Junctions 3 to 12	Nationally Significant Infrastructure Project	Improvement of 32 miles of M4 Motorway from Junction 3 in Borough of Hounslow, London to Junction 12 in West Berkshire.	Boroughs of Hounslow, Hillingdon, South Bucks, Slough, Windsor and Maidenhead,	n/a	

Reference identification (ID)	Local planning authority (LPA) and planning reference	Type (permission or allocation)	Description	Site address	Applicant	Comment
	Smart Motorway			Bracknell Forest and Wokingham.		
Langley/20	Slough Borough Council Slough Rapid Transit	Local Transport Plan Scheme	Provision of segregated bus lanes and other priority measures between Slough Trading Estate, Slough town centre and east to Junction 5 of the M4 motorway. It is linked to the delivery of significant employment floorspace (on Slough Trading Estate and in Slough town centre) and over 3,000 dwellings.	Slough Mass Rapid Transit (SMaRT) Phase 1 extends from Slough Trading Estate to Junction 5 of the M4, while Phase 2 would extend SMaRT eastwards to the borough boundary and Heathrow	n/a	
Langley/21	Slough Borough Council Slough A332 Improvements	Local Transport Plan Scheme	Junction improvements, road widening and other works along the A332. It will reduce congestion, encourage a smoother flow of vehicles and provide journey time reliability. It will support delivery plans for Slough town centre – including 3,000 new dwellings.	A332 Windsor Road, Slough	n/a	
Langley/22	Slough Borough Council Slough A355 Route	Local Transport Plan Scheme	The scheme involves the remodelling of the Copthorne roundabout, signal and junction upgrades, selected road widening and bus priority measures. It will support the delivery of major regeneration schemes in Slough town centre and Slough Trading Estate, contributing to significant housing and employment growth.	A355 Tunis Lane, Slough	n/a	
Langley/23	Surrey County Council	Local Transport Plan	Carriageway widening on the bridge and	Staines Bridge, Staines Upon Thames,	n/a	

Reference identification (ID)	Local planning authority (LPA) and planning reference	Type (permission or allocation)	Description	Site address	Applicant	Comment
	Staines Bridge Widening (Project 5)	Scheme	foot/cycle way on upstream side.	Spelthorne		
Langley/24	Surrey County Council Clockhouse Lane footbridge (Project 7)	Local Transport Plan Scheme	The route is one of the main local cross-county traffic routes to Heathrow and currently has no pedestrian route over the railway line from Ashford to Bedfont Lakes.	Clockhouse Lane footbridge, Ashford, Spelthorne	n/a	

2 Pending Developments

- 2.1.1.1 Table 2 lists proposed development (either planning applications that have yet to be determined or spatial allocations included in local plans and non-statutory plans yet to be adopted) identified as of 28 February 2015.
- 2.1.1.2 The proposed developments listed are those where the potential for environmental effects may occur were these applications to be granted or local plans become adopted. Proposed development has not been subject to any assessment within the environmental assessment due to uncertainty concerning its likely status in relation to the proposed HEx depot. Due to uncertainties related to this type of development they have not been mapped.

Table 2: Pending Development as of 28 February 2015

Reference identification (ID)	Local planning authority (LPA) and planning reference	Type (permission or allocation)	Description	Site address	Applicant	Comment
Langley/p/1	Buckinghamshire County Council CM/02/15	Application	Wood Recycling Facility including the erection of a processing building, lorry parking, storage areas, weighbridge and office, stores and welfare accommodation and, ancillary development.	Land at Thorney Business Park, Thorney Lane, North Iver, Buckinghamshire, SLo 9HF	Mr Charlie Jones	
Langley/p/2	Slough Borough Council Western Rail Access to Heathrow	Local Transport Plan Scheme	The Western Rail Access to Heathrow project will create a new connection of around 4 km with the nearby Great Western Mainline (GWML), providing a more direct rail route for passengers travelling to and from Reading, Oxford, South Wales, Bristol, Midlands and beyond.	Boroughs of Hillingdon, South Bucks, and Slough	n/a	A development consent order application is in preparation and is expected to be submitted in spring 2016.

SES and AP2 ES Appendix HEX-CM-001

Environmental topic:	Community	CM
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

1.1.1 The community appendix for the Supplementary Environmental Statement (SES) and the Additional Provision 2 (AP2) Environmental Statement Volume 4: Off-route effects comprises:

- community impact assessment record sheets for construction (Section 1.1.2);
- community impact assessment record sheets for operation (Section 3); and
- open space survey/public rights of way (PRoW) survey results (Section 4).

1.1.2 Maps referred to throughout the community appendix are contained in the Volume 5, Community Map Book.

2 Community impact assessment record sheet - construction

2.1 Residential properties on Mead Avenue and Maplin Park

Table 1: Residential properties on Mead Avenue and Maplin Park community impact assessment record sheet

Resource name	Residential properties on Mead Avenue and Maplin Park
Community Forum Area	Volume 4: Off-route effects.
Resource type	Residential properties.
Resource description/profile	Residential properties at the northern end of Mead Avenue and Maplin Park, as shown on Map CM-01,E6 (Volume 5, Community Map Book).
Assessment year	Construction phase (2017+).
Impact 1: loss of amenity	<p>Impact: residents of approximately 20 properties on Mead Avenue and Maplin Park are predicted to experience in-combination effects arising from significant visual and noise effects during the construction phase, resulting in a loss of amenity.</p> <p>Visual: there will be visual effects associated with views north of the HEx Depot main compound, maintenance shed and associated offices, for the duration of the construction works.</p> <p>Noise: there will be significant noise effects associated with construction activities at HEx Depot main compound over a period of four to six months.</p> <p>Duration: effects will coincide for approximately four to six months.</p>
Assessment of magnitude	Low: as residents will be affected by significant residual effects arising from visual and noise effects, but for less than six months.
Relevant receptors	Owners/occupiers of the residential properties.
Assessment of sensitivity of receptor(s) to impact	High: as these are residential receptors.
Significance rating of effect	Moderate adverse- significant effect on residents due to loss of amenity.
Proposed mitigation options for significant effects	No further mitigation of amenity effects.
Residual effect significance rating	Moderate adverse- significant effect on residents due to loss of amenity.

3 Community impact assessment record sheet - operation

- 3.1.1 Within the study area, no significant effects on residential properties, community facilities or open space and recreational public right of way (PRoW) during operation have been identified within the assessment; accordingly no community impact assessment record sheets are presented here.

4 Open space survey/public rights of way survey results

- 4.1.1 Within the study area no significant effects on open spaces or PRoW have been identified within the assessment; accordingly no user surveys of open spaces or PRoW are presented here.

SES and AP2 ES Appendix HEX-CH-001

Environmental topic:	Cultural heritage	CH
Appendix name:	Baseline report	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

- 1.1.1 The cultural heritage appendices for the proposed Heathrow Express (HEX) Depot comprise:
- baseline reports (SES AP2 ES Volume 4);
 - a gazetteer of heritage assets (SES AP2 HEX-CH-002); and
 - an impact assessment table (SES AP2 HEX-CH-003).
- 1.1.2 In addition this appendix (SES and AP2 ES Appendix HEX-CH-001) contains information on the historic and archaeological character of the proposed HEX Depot area and the wider study area.
- 1.1.3 Maps referred to throughout the cultural heritage appendices are contained in the Volume 5, Cultural Heritage Map Book.

2 Archaeological character

2.1 Introduction

- 2.1.1 To determine the archaeological potential of the study area, it has been classified as an archaeological character area. The archaeological character area has been derived from a consideration of the current topography, geology and current land use of the area. From these factors the potential for recovery of archaeological remains is considered.
- 2.1.2 The landscape was further subdivided into archaeological sub-zones (ASZ), which have allowed for a more in-depth understanding of the archaeological potential of the Study area. The study area has been sub-divided into seven ASZ.
- 2.1.3 Although initially defined and characterised by current land use a number of additional factors have determined the potential of these sub-zones to contain archaeological remains of significance. These factors include topography, geology, historic character and distribution of known archaeological finds, sites and assets.

2.2 Character area

Archaeological character area; Slough, Langley and Iver Industrial Area

- 2.2.1 The landscape of character of the study area is defined by the Colne Valley Historic Landscape Characterisation Assessment as being part of the Slough Branch Industrial Zone¹. This defines the area as an industrialised landscape which developed along the path of the Great Western railway (LANo14) and the Slough Arm of the Grand Union Canal (LANo16).

¹ Buckinghamshire County Council, Groundwork Thames Valley (2007) Colne Valley Park Historic Landscape Characterisation.

2.2.2 The study area has a twentieth century constructed landscape with modern field systems and a golf course in the north of the zone acting as a buffer between the industrial area and the historic zones of Iver and Langley Park (to the north of the study area). In addition the area has seen large scale aggregate extraction with much of the area quarried for clay and gravel.

2.2.3 There are several prehistoric (particularly Palaeolithic) findspots recorded along the paths of the railway and canal but the potential for further archaeological discoveries for this zone is considered to be low due to the level of extraction that would have affected much of the below ground archaeology.

2.3 Character sub-zones

2.3.1 The ASZ are presented in Table 1. An indication of archaeological potential for each ASZ is also provided. The ASZ are mapped, refer to the Volume 5: Cultural Heritage Map Book.

Table 1: Archaeological Sub Zones

No	Name	Geology/soils	Modern land use	Historic character	Archaeology
1	Former aggregate Quarries. (Across character area.)	Largely made ground. Mapped as brickearth and Thames Valley Gravels (Taplow gravels and Lynch Hill Gravels).	Farm land and light industrial use.	Formerly late post medieval enclosed farmland. Late 19th century/20th century aggregate extraction and landfill.	Negligible archaeological potential due to aggregate extraction.
2	Langley (Langley Marsh)	Mapped as brickearth and Thames Valley Gravels.	Langley urban area.	Historic core of Langley, former World War II aircraft factory (Hawker Aircraft Company).	Potential for prehistoric artefacts (particularly Palaeolithic remains). Medieval historic core of Langley. World War II aircraft factory.
3	Iwer Golf Club	Mapped as brickearth and Thames Valley Gravels.	Golf course.	Formerly late post medieval enclosed farmland.	Potential for prehistoric artefacts (particularly Palaeolithic remains).
4	19th century communication routes	Mapped as brickearth and Thames Valley Gravels.	Communication routes and associated infrastructure.	Great Western Railway and Slough Arm of the Grand Union Canal	Negligible archaeological potential due to cutting of canal and railway. 19th century railway and canal infrastructure.
5	Former oil depot	Made ground. Mapped as brickearth and Thames Valley Gravels.	Light industrial and scrub.	Formerly late post medieval enclosed farmland.	Negligible archaeological potential due to construction of oil depot.
6	Southern end of nature reserve and field adjacent to Hollow Hill Lane	Mapped as brickearth and Thames Valley Gravels.	Agricultural field (crossed by some services) and a Nature Reserve.	Formerly late post medieval enclosed farmland.	Potential for prehistoric artefacts (particularly Palaeolithic remains).

No	Name	Geology/soils	Modern land use	Historic character	Archaeology
1	Former aggregate Quarries (Across character area)	Made ground. Mapped as brickearth and Thames Valley Gravels (Taplow gravels and Lynch Hill Gravels).	Farm land and light industrial use.	Formerly late post medieval enclosed farmland. Late 19th century/20th century aggregate extraction and landfill.	Negligible archaeological potential due to aggregate extraction.
2	Langley (Langley Marsh)	Mapped as brickearth and Thames Valley Gravels.	Langley urban area.	Historic core of Langley, former World War II aircraft factory (Hawker Aircraft Company)	Potential for prehistoric artefacts (particularly Palaeolithic remains). Medieval historic core of Langley. World War II aircraft factory.
3	Iver Golf Club	Mapped as brickearth and Thames Valley Gravels.	Golf course.	Formerly late post medieval enclosed farmland.	Potential for prehistoric artefacts (particularly Palaeolithic remains).
4	19th century communication routes	Mapped as brickearth and Thames Valley Gravels.	Communication routes and associated infrastructure.	Great Western Railway and Slough Arm of the Grand Union Canal.	Negligible archaeological potential due to cutting of canal and railway. 19th century railway and canal infrastructure.
5	Former oil depot	Made ground. Mapped as brickearth and Thames Valley Gravels.	Light industrial and scrub.	Formerly late post medieval enclosed farmland.	Negligible archaeological potential due to construction of oil depot.
6	Southern end of nature reserve and field adjacent to Hollow Hill Lane	Mapped as brickearth and Thames Valley Gravels.	Agricultural field (crossed by some services) and a Nature Reserve.	Formerly late post medieval enclosed farmland.	Potential for prehistoric artefacts (particularly Palaeolithic remains).

3 References

Buckinghamshire County Council, Groundwork Thames Valley (2007) Colne Valley Park Historic Landscape Characterisation.

SES and AP2 ES Appendix HEX-CH-002

Environmental topic:	Cultural heritage	CH
Appendix name:	Gazetteer of heritage assets	002
Community forum area:	Heathrow Express Depot Langley	HEX

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1 Introduction

1.1.1 This appendix provides descriptive information for the proposed Heathrow Express Depot (HEX) relating to identified designated and non-designated heritage assets that lie within the following study areas:

- designated assets: within the land required for the construction of the proposed HEX Depot and the 1km study area; and
- non-designated assets (identified by the Heritage Gateway): within the land required for the construction of the proposed HEX Depot, the 500m study area.

2 Gazetteer

Table 1 : Gazetteer of heritage assets for the proposed HEx Depot

Unique ID	Map reference	Asset type	Name	Description	Period	Designation	Grade	Significance/value	NHL reference	HER/Heritage Gateway Ref.
LAN001	CH01	Earthwork	Two concentric ditches showing as crop marks at Thorney	Ploughed out remains of scheduled medieval moat. Located in arable field, adjacent to M25 and screened from the surrounding landscape by surrounding tree line.	Medieval	Scheduled Monument	N/A	High	1006944	N/A
LAN002	CH01	Built Heritage	The Harrow Public House, Langley	Timber framed mid-17th century public house with later additions. Located in historic core of Langley Marsh and offset by a car park from main thoroughfare.	Post medieval	Listed Building	II	Moderate	1113381	N/A
LAN003	CH01	Built Heritage	Wall approximately 5 metres to East Of Langley Hall	Wall. Approximately 25 metres long and 1.5 metres high. Late C17. Red brick with toothed and chamfered coping.	Post Medieval	Listed Building	II	Moderate	1113388	N/A

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				Central blocked gateway with stone coped square piers.						
LANoo4	CHo1	Built Heritage	Langley Hall	House, now part of a school. Late C17 with early to mid C18 facade, rebuilt internally and wings rebuilt in late 1970s. Grey brick headers with red brick window dressings and stone quoins. Located in the core of Langley on busy junction but set back from road. Surrounding and adjoining walls also Grade II listed.	Post medieval	Listed Building	II	Moderate	1313117	N/A
LANoo5	CHo1	Built Heritage	Wall approximately 20m to north-west of Langley Hall	Wall. Approximately 53 metres long and 1.5 metres high. Dated 1666 on stone to north. Red brick with toothed and chamfered coping.	Post medieval	Listed Building	II	Moderate	1135764	N/A
LANoo6	CHo1	Built Heritage	Wall adjoining Langley Hall	Wall. Approximately 100 metres long and 2 metres high. Late	Post medieval	Listed Building	II	Moderate	1135739	N/A

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				17th century. Red brick with toothed and chamfered coping.						
LAN007	CH01	Built Heritage Earthwork	Moat House, Iver	Circa 1600, two story house, with a long gallery late 17th century addition. House is located within (unscheduled) medieval moat. High surrounding tree line around moat, gives the house and moat a secluded rural setting. However, setting is slightly impacted by the adjacent busy Langley Park Road and the house and moat are near the flight corridor for Heathrow.	Post medieval/m edieval	Listed Building	II	Moderate	1164603	N/A
LAN008	CH01	Built Heritage	Barn to north of Moat House	Circa 1600. Nine bays; aisled. Weather-boarded; pantile roof. Two cart entrances, the left hand one weather-boarded and gabled, the right hand one of brick and hipped-	Post medieval	Listed Building	II	Moderate	11243.74	N/A

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				roofed.						
LANo09	CHo2	Findspot	Lower Palaeolithic flints found at 'Great Western Pit', Iver	Lower Palaeolithic flint implements including 19 axeheads and 4 retouched flakes recovered from the 'Great Western Pit'.	Palaeolithic	N/A	N/A	Moderate	N/A	394652
LANo10	CHo2	Findspot	Lower Palaeolithic Implements, Slough Arm, Grand Union Canal, Langley	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.	Palaeolithic	N/A	N/A	Moderate	N/A	394661
LANo11	CHo2	Findspot	Lower to Middle Palaeolithic handaxes. Great Western Railway, Langley	Four Lower to Middle Palaeolithic flint handaxes found during railway cutting for the Great Western Railway.	Palaeolithic	N/A	N/A	Moderate	N/A	80500000
LANo12	CHo2	Documentary evidence	Site of the 20th century Hollow Hill	Gravel pit shown on 1970s Ordnance	Modern	N/A	N/A	Negligible	N/A	0904200000

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			Gravel Pit, Iver	Survey Map.						
LANo13	CHo2	Documentary evidence	Site of the Great Western Pit	The Great Western Pit lies between the railway and the canal in an area of Lynch Hill Gravel with overlying Brickearth geology. The pit is one of the oldest Iver pits and was operating in the 1890's.	Post medieval	N/A	N/A	Negligible	N/A	
LANo14	CHo2	Documentary evidence	Great Western Railway	First section of the Great Western Railway between Paddington and Maidenhead opened 1838.	Post medieval	N/A	N/A	Low	N/A	
LANo15	CHo2	Documentary evidence	Site of unnamed pit and tramway, Langley	Site of gravel pit and former tramway located in northern half of a later nature reserve.	Modern	N/A	N/A	Low	N/A	N/A
LANo16	CHo2	Documentary evidence	Slough Arm of the Grand Union Canal	The Slough Arm of the Grand Union Canal was opened in 1882. The canal was used to transport bricks, gravel and landfill.	Post medieval	N/A	N/A	Low	N/A	

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LANo17	CHo2	Findspot	Findspot for Mesolithic Tranchet axe, Langley Station	19th century findspot for a Mesolithic tranchet axe.	Mesolithic	N/A	N/A	Low	N/A	
LANo18	CHo2	Findspot	Findspot for Neolithic and Bronze Age flints. 'Lavender Pit', Iver	Neolithic and Bronze Age worked flints found during quarrying in the late 19th early 20th centuries.	Prehistoric	N/A	N/A	Low	N/A	
LANo19	CHo1	Built Heritage	2,4,6,8, St Marys Road, Langley	Four Almshouses. Dated 1617. Founded by Sir John Kederminster. Located adjacent to St Mary's church burial ground. Located in historic core retains a rural village core setting. Located in St Mary's Langley conservation area.	Post Medieval	Listed Building	II*	High	1113384	
LANo20	CHo1	Built Heritage	Houblone Tomb approximately 1 metre to East of North Chapel of Church of St. Mary	Chest tomb. Dated 1722. Red brick with moulded base and moulded stone top. Inscribed on top: Here Lies the Body of Abraham Houblone Esq who died at Langley the	Post Medieval	Listed Building	II	Moderate	1113385	

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				11th of May 1722.						
LANo21	CHo1	Built Heritage	Webb Tomb approximately 12 metres to South-West of Nave Of Church Of St. Mary	Chest tomb. Dated 1795. Ashlar. Moulded base and top, beaded corners, and oval panelled sides. Inscribed: Beneath this tomb are the Remains of Mr. James Webb.	Post Medieval	Listed Building	II	Moderate	1113386	
LANo22	CHo1	Built Heritage	12, 14, 16, 18, 20, 22, St Marys Road	A group of six almshouses dated 1679 and 1678. Red brick with cement rendered window dressings, porch, and ground floor.	Post Medieval	Listed Building	II*	High	1113387	
LANo23	CHo1	Built Heritage	Stable Range at Thorney Farm	18th century red brick and stock brick stable range with hipped plain tile roof.	Post Medieval	Listed Building	II	Moderate	1124382	
LANo24	CHo1	Built Heritage	Iver Court Farmhouse	Late 18th century. Brown brick with old tile hipped roofs and end wall stacks.	Post Medieval	Listed Building	II	Moderate	1124404	
LANo25	CHo1	Built Heritage	The Red Lion Public House	Public house. Mid to late 16th century with 20th century additions	Post Medieval	Listed Building	II	Moderate	1135748	

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				to rear. Rendered timber frame, exposed in right-hand end, and old tile roof. Located in St Mary's conservation area.						
LANo26	CHo1	Built Heritage	Church Of St Mary	Church. 12th century and 14th century with tower of 1609, south transept of 1613, north aisle arcade dated 1630, west porch of 1818, and some 19th century restoration. Located in St Mary's conservation area.	Post Medieval	Listed Building	I	High	1135750	
LANo27	CHo1	Built Heritage	Ive Tomb approximately 3 metres to the North of North aisle of Church of St Mary	This Tomb is created in the memory of Mr. Edward Ive of this parish who died January 1817 Aged 76 years.	Post Medieval	Listed Building	II	Moderate	1135753	
LANo28	CHo1	Built Heritage	Thorney House	18th century. Brick; old tile-hipped roof.	Post Medieval	Listed Building	II	Moderate	1164740	
LANo29	CHo1	Built Heritage	The Tower Arms Public House	Timber framed and brick 18th century public house.	Post Medieval	Listed Building	II	Moderate	1164843	

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LANo30	CHo1	Built Heritage	St Mary's Conservation Area, Langley	Conservation area covering the historic core of Langley, centred around the church of St Mary's. The area and buildings within the conservation still retains a rural village core setting. However the setting is slightly degraded by the intrusion of modern urban development around the conservation area fringes.	Post Medieval	Conservation Area	N/A	Moderate		
LANo31	CHo2	Built Heritage	Dog, Kennel Railway Bridge	Former listed 19th century railway bridge, now demolished.	Post medieval	De-listed	N/A	Negligible	N/A	474452
LANo32	CHo2	Findspot	Everlasting Tile Company Pit, Palaeolithic findspot	Lower Palaeolithic flint implements found in brickearth quarry.	Post medieval	N/A	N/A	Moderate	N/A	395092
LANo33	CHo2	Documentary evidence	Iver Station	Site of original 19th century Iver Train Station.	Post medieval	N/A	N/A	Low	N/A	502276

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LANo34	CHo2	Findspot	Iron Age Roman pottery, Langley Business Centre	Iron Age and Roman pottery findspot.	Prehistoric, Roman	N/A	N/A	Low	N/A	394699
LANo35	CHo2	Findspot	Slough and Langley Brickworks. Palaeolithic findspot	Findspot for Lower Palaeolithic flint implements found in brickearth quarry.	Prehistoric	N/A	N/A	Moderate	N/A	395101
LANo36	CHo2	Earthwork	Moat, Langley Park Road	Earthwork of potential medieval moat.	Medieval	N/A	N/A	Low	N/A	395052
LANo37	CHo1	Built Heritage	Great Western Railway Bridge	19th century railway bridge.	Post medieval	Listed Building	II	Moderate	1391572	
LANo38	CHo1	Built Heritage	Chest Tomb Approximately 36 metres to The North of North Aisle of Church of St Mary	Late post medieval chest tomb.	Post medieval	Listed Building	II	Moderate	1321983	
LANo39	CHo1	Built Heritage	Seymour Tomb Adjoining South Transceptal	Late post medieval chest tomb.	Post medieval	Listed Building	II	Moderate	1313115	

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			Chapel of Church of St. Mary							
LANo40	CHo1	Built Heritage	Granary at Tithe Court, Slough	18th century timber framed granary.	Post medieval	Listed Building	II	Moderate	1251377	

SES and AP2 ES Appendix HEX-CH-003

Environmental topic:	Cultural heritage	CH
Appendix name:	Impact assessment table	003
Community forum area:	Heathrow Express Depot Langley	HEX

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1 Introduction

- 1.1.1 Table 1 presents information on the impacts on all identified heritage assets and the likely resultant environmental effects, taking into account agreed mitigation measures. Details on the assignment of values and the assessment of the scale of impacts are set out in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2).

2 Impact assessment

Table 1: Impact assessment for the proposed Heathrow Express(HEX) Depot

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
LAN001	Two concentric ditches showing as crop marks at Thorney	Scheduled Monument	High	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN002	The Harrow Public House, Langley	Listed building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN003	Wall approximately 5 metres to East Of Langley Hall	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN004	Langley Hall	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN005	Wall approximately 20m to north-west of	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
	Langley Hall									
LAN006	Wall adjoining Langley Hall	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN007	Moat House, Iver	Listed Building	Moderate	Potential for slight impact on the visual setting of the asset from the construction of the depot and the moment of traffic on the adjacent road.	Minimal	Minor Adverse	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN008	Barn to north of Moat House	Listed Building	Moderate	Potential for slight impact on the visual setting of the asset from the construction of the depot and the moment of traffic on the	Minimal	Minor Adverse	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
				adjacent road.						
LAN009, LAN010, LAN011	Lower to Middle Palaeolithic Remains	N/A	Moderate	The asset is potentially within the area required for the construction of the proposed HEx Depot. Where the Thames Valley Terrace deposits survive within the proposed HEx Depot there is potential for the removal of these remains.	High	Major Adverse	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LAN012	Site of the 20th century Hollow Hill Gravel Pit,	N/A	Negligible	The asset is partly within the area required for the	Minimal	Negligible	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
	Iver			construction of the proposed HEx Depot. The construction of the scheme will remove part the asset but will not affect the value of the asset.						
LANo13	Site of the Great Western Pit	N/A	Negligible	The asset is partly within the area required for the construction of the proposed HEx Depot. The construction of the scheme will remove part of the asset but will not affect the value of the asset as the understanding of the asset	Minimal	Negligible	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
				is largely through historical rather than physical context..						
LANo14	Great Western Railway	N/A	Low	The asset is partly located within the land required for the construction of the scheme. However the construction of the scheme is not anticipated to impact on any of the historical elements of the railway and is not anticipated to impact the value of the asset as the asset will continue to	Minimal	Negligible	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
				operate as a railway.						
LANo15	Site of unnamed pit and tramway, Langley	N/A	Low	The asset is partly within the area required for the construction of the proposed HEx Depot. The construction of the scheme will remove part of the asset but will not affect the value of the asset as the understanding of the asset is largely through historical rather than physical context..	Minimal	Negligible	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo16	Slough Arm of the Grand	N/A	Low	No impact on value of	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
	Union Canal			asset.						
LANo17	Findspot for Mesolithic Tranchet axe, Langley Station	N/A	Low	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo18	Findspot for Neolithic and Bronze Age flints. 'Lavender Pit', Iver	N/A	Low	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo19	2,4,6,8, St Marys Road, Langley	Listed Building	High	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo20	Houblone Tomb approximately 1 metre to East of North Chapel of Church of St. Mary	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo21	Webb Tomb approximately	Listed Building	Moderate	No impact on value of	No	Neutral	No impact on	No change	Neutral	Not reported in the main

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
	y 12 metres to South-West of Nave Of Church Of St. Mary			asset.	change		value of assets			ES or in AP1
LANo22	12, 14, 16, 18, 20, 22, St Marys Road	Listed Building	High	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo23	Stable Range at Thorney Farm	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo24	Iver Court Farmhouse	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo25	The Red Lion Public House	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo26	Church Of St Mary	Listed Building	High	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo27	Ive Tomb approximately 3 metres to	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
	the North of North aisle of Church of St Mary									
LANo28	Thorney House	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo29	The Tower Arms Public House	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo30	St Mary's Conservation Area, Langley	Conservation Area	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo31	Dog, Kennel Railway Bridge	De-listed	Negligible	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo32	Everlasting Tile Complan Pit, Palaeolithic findspot	N/A	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo33	Iver Station	N/A	Low	No impact on value of	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
				asset.						
LANo34	Iron Age Roman pottery, Langley Business Centre	N/A	Low	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo35	Slough and Langley Brickworks. Palaeolithic findspot	N/A	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo36	Moat, Langley Park Road	N/A	Low	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo37	Great Western Railway Bridge	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo38	Chest Tomb Approximately 36 metres to The North of North Aisle of Church of	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-CH-003

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
	St Mary									
LANo39	Seymour Tomb Adjoining South Transceptal Chapel of Church of St. Mary	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1
LANo40	Grannary at Tithe Court, Slough	Listed Building	Moderate	No impact on value of asset.	No change	Neutral	No impact on value of assets	No change	Neutral	Not reported in the main ES or in AP1

SES and AP2 ES Appendix HEX-EC-001

Environmental topic:	Ecology	EC
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

- 1.1.1 This document is an appendix which forms part of Volume 5 of the Supplementary Environmental Statement (SES) and Additional Provision 2 Environmental Statement (AP2 ES). It details supplementary ecological baseline data collected since the ES published in November 2013 (the 'main ES') for the following ecological aspects and species:
- designated sites;
 - habitats;
 - river habitat survey;
 - river corridor survey;
 - amphibians; and
 - bats;
- 1.1.2 The ecological baseline data detailed within this document relates to the proposed Heathrow Express (HEX) Depot at Langley in Slough.
- 1.1.3 The document should be read in conjunction with Volume 2 (community forum area (CFA) reports), Volume 3 (route-wide effects assessment) and Volume 4 (off-route effects assessment) of the SES and AP2 ES.

2 Designated sites

2.1 Introduction

- 2.1.1 This section of the appendix presents details of sites designated on the basis of their importance for nature conservation, which fall within the scope of the ecological assessment for the relocation of the HEX Depot to Langley (hereafter referred to in this report as the amendment).

2.2 Methodology

- 2.2.1 Data searches were initially undertaken to identify designated sites as follows:
- statutory designated sites within 5km of the land required for the construction of the amendment; and
 - non-statutory designated sites within 5km of the land required for the construction of the amendment.
- 2.2.2 Information on designated sites was obtained from the following data sources:
- Natural England;
 - Greenspace Information for Greater London (GiGL);
 - Buckinghamshire and Milton Keynes Environmental Records Centre; and
 - Thames Valley Environmental Records Centre.

2.2.3 All sites within the extents defined within the Scope and Methodology Report (SMR) for this area of the route were then reviewed to identify those that were considered likely to be relevant to the assessment. Due to the large scale only details of those sites meeting the following criteria are presented within the baseline section:

- all statutory designated sites within a 500m radius of the land required for the amendment;
- any other statutory designated sites which are considered to potentially be subject to significant effects;
- all non-statutory designated sites within the extent of, or adjacent to, the amendment; and
- any other non-statutory designated sites which are considered to potentially be subject to significant effects.

2.3 Baseline

Statutory designated sites

2.3.1 There are no statutory sites located within 500m of the land required for the amendment.

Non-statutory designated sites

2.3.2 Table 1 provides details of non-statutory designated sites relevant to the assessment, based on the criteria identified in Section 2.2.3.

Table 1: Non-statutory designated sites relevant to the assessment of the HEx Depot at Langley development

Site name and designation	OS grid reference	Site description	Approximate distance from the proposed HEx Depot (m) and orientation	Site
Land West of Hollow Hill Lane proposed non-statutory informal nature reserve	TQ 019 798	Site comprises grassland, arable, young trees and scrub	Within an area of land required for the amendment	HEx Depot at Langley

3 Phase 1 habitat survey

3.1 Introduction

3.1.1 This section of the appendix details supplementary ecological baseline data relating to habitats relevant to the assessment of the amendment.

3.2 Methodology

3.2.1 Details of the standard methodology utilised for Extended Phase 1 habitat survey of the proposed HEx Depot at Langley are provided in the SMR Addendum (Volume 5: Appendix CT – 001-000/2 of the main ES). Surveys were carried out during the 24-27 March 2014.

3.2.2 Reference has been made to the local Biodiversity Action Plans (BAPs) of the relevant London boroughs.

3.3 Deviations, constraints and limitations

3.3.1 Access restrictions meant that the habitat survey did not cover the full extent of the development area. Access was not permitted to survey the eastern part of the proposed non-statutory informal nature reserve, and land to the east and south-east of Hollow Hill Lane. There was no access to rail land.

3.4 Baseline

3.4.1 The various land parcels include an industrial estate; hard-standing and numerous buildings; arable farmland; and neglected land featuring grassland, woodland and scrub areas, and waterbodies. Habitats are described in sections 3.1.6 to 3.1.21.

Woodland

3.4.2 There is semi-natural broad-leaved woodland west of Langley Park Road, which surrounds a section of moat to the north east of the site. This woodland is likely to be of secondary origin given its age structure. Its canopy includes ash (*Fraxinus excelsior*), common alder (*Alnus glutinosa*), elm (*Ulmus* species), sycamore (*Acer pseudoplatanus*) and willow (*Salix* species), and the field-layer is species-poor, being characterised by common nettle (*Urtica dioica*) and ground-ivy (*Glechoma hederacea*) with semi-ruderal species and garden escapes such as daffodil (*Narcissus* species).

3.4.3 Other woodland recorded in the Langley area also appears to be of secondary origin and includes willow (*Salix* species) dominated stands associated with poorly draining land west of Thorney Lane. Tree cover in this area sits within scrub dominated by blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*). In all cases, the field-layers were noted to be species-poor.

Trees

3.4.4 Mature trees are scattered along the Grand Union Canal (GUC) banks, around the site west of Thornley Lane North, and in the woodland west of Langley Park Road. Species include oak (*Quercus robur*) and willow (*Salix* species). Mature trees have intrinsic

nature conservation value and some have additional wildlife value, for example bat roosting potential (reported in the relevant sections).

Scrub

- 3.4.5 Naturally regenerating scrub is a common feature in the neglected land parcels of the Langley area. Individual stands of bramble (*Rubus fruticosus* agg.) and hawthorn punctuate many of the unmanaged grassland areas whilst blackthorn often encroaches from the edges. Other species including elder (*Sambucus nigra*) add species diversity and scrubby stands are also interspersed with young trees or in some areas mature trees of ash and pedunculate oak (*Quercus robur*). Typically, these stands support an impoverished ground flora dominated by bare ground, leaf litter bramble, common nettle (*Urtica dioica*) and ivy (*Hedera helix*).

Grassland

- 3.4.6 Grassland occupying a site north of the GUC is subject to informal grazing by horses, and has a short sward supporting grasses including common bent (*Agrostis capillaris*) and red fescue (*Festuca rubra*) with common neutral grassland forbs such as common mouse-ear (*Cerastium fontanum*), common ragwort (*Senecio jacobaea*), ribwort plantain (*Plantago lanceolata*) and selfheal (*Prunella vulgaris*). The grassland is disturbed and in places enriched, with localised stands of nettles and docks as well as white horehound (*Marrubium vulgare*) and discarded garden plants including daffodil.
- 3.4.7 Rough semi-natural neutral grassland recorded on neglected land was found to be of typically rank character supporting coarse grasses such as cock's-foot (*Dactylis glomerata*), false oat-grass (*Arrhenatherum elatius*) and Yorkshire-fog (*Holcus lanatus*). Scrub species, particularly scattered hawthorn bushes, patches of bramble and suckering blackthorn have encroached into the grassland but created an interesting grassland/scrub mosaic of value to wildlife. In areas of more recent disturbance the vegetation grades from ephemeral/short perennial communities to tall ruderal and rank grassland habitat.

Ruderal

- 3.4.8 The rank grassland swards often contain patches of common nettle and more extensive nettle-beds are found in places. Other ruderals include rosebay willowherb (*Chamerion angustifolium*) as well as bristly ox-tongue (*Picris echioides*) and thistles (*Cirsium* spp.). The invasive weed species Japanese knotweed (*Fallopia japonica*) is present in several areas and has been mapped separately to other ruderal vegetation.

Ephemeral/short perennial

- 3.4.9 Previously developed land east of Langley station supports ephemeral/short perennial vegetation, with some low-lying areas subject to water-logging. The vegetation grades into more closed grassland in places, but the sward is generally open and comprises a mixture of grasses, short annual and perennial herbs, mosses, and scattered tall ruderals and shrub saplings. Species recorded include bryophytes such as *Brachythecium rutabulum* and *Calliergonella cuspidata* on relatively bare ground grading into ephemeral and short perennial vegetation supporting common mouse-ear (*Cerastium fontanum*), creeping bent (*Agrostis stolonifera*), creeping cinquefoil (*Potentilla reptans*), false oat-grass (*Arrhenatherum elatius*), ribwort plantain (*Plantago*

lanceolata), teasel (*Dipsacus fullonum*), white clover (*Trifolium repens*) and Yorkshire-fog (*Holcus lanatus*). Tall herbs and ruderal vegetation includes weld (*Reseda luteola*), curled dock (*Rumex crispus*) and fleabane (*Conyza* sp). It is likely this area meets the Section 41 criteria¹ for 'open mosaic habitats on previously developed land'.

- 3.4.10 An area of cleared scrub west of Thorney Lane, which comprises bare ground in the process of colonisation by opportunistic ruderals including thistles, willowherbs and rank grasses, is a species poor transition community.

Buildings/hard-standing

- 3.4.11 Numerous buildings and areas of hard-standing are present in the Langley area, including industrial estates, mobile homes, electricity sub-stations, and several modern, metal-clad buildings.

Arable

- 3.4.12 Several arable fields are present in the Langley area, especially to the north of the GUC.

Waterbodies

- 3.4.13 The GUC runs along the northern boundary of the proposed HEx Depot at Langley and is characteristically steep-sided and eutrophic, with adjacent habitats including tow-path grassland, scrub, tall ruderal and scattered trees. The banks of the canal are sheet-piled in places. Where emergent vegetation is present it is typically dominated by a mix of reed sweet-grass (*Glyceria maxima*), pond-sedge (*Carex acutiformis* or *C. riparia*) with occasional bulrush (*Typha latifolia*).
- 3.4.14 There are several ponds recorded in the Langley area, which include shallow water-logged areas, attenuation ponds (concrete-lined) and a moat. Most of the ponds are found in an area of land west of Langley Lane South, and these are either dominated by willows (*Salix* species) or support plants of open water margins such as bulrush (*Typha latifolia*), celery-leaved buttercup (*Ranunculus sceleratus*), common bent (*Agrostis stolonifera*), floating sweet-grass (*Glyceria fluitans*) and hard rush (*Juncus inflexus*). One of the ponds has an adjacent area of swamp vegetation dominated by a pond-sedge (*Carex acutiformis* or *C. riparia*). The moat is located in the north-east of the site and is heavily shaded by trees and no aquatic or emergent vegetation was present at the time of survey.
- 3.4.15 Ponds that meet the UKBAP habitat description criteria are Section 41 habitats.
- 3.4.16 Ditches and streams noted from the area are small (approximately 1m wide), and eutrophic.

Watercourses

- 3.4.17 There are two watercourses in this area; The GUC and Horton Brook. Detailed habitat surveys of these watercourses were undertaken in March 2015, namely river corridor

¹ UK Biodiversity Action Plan; Priority Habitat Descriptions. (ed. Ant Maddock) 2008. (Updated July 2010) provides information on the qualifying features for each habitat. For open mosaic on previously developed land these are extent, diversity of successional stages, component species and communities, structure and history of disturbance.

(RCS) and river habitat surveys (RHS). The findings of these surveys are presented in following sections.

4 River habitat survey

4.1 Introduction

4.1.1 This section of the appendix presents details of RHS² data for watercourses within a 250m buffer of the HEx Langley development.

4.2 Methodology

4.2.1 Details of the standard methodology utilised for RHS are provided in the Technical Note HS2 Ecological Surveys: Field Survey Methods and Standards (FSMS) which is included as an appendix to Volume 1 of the main ES.

4.2.2 Desk study sources used to support the survey included Environment Agency data. No previous RHSs have been recorded in the HEx Langley development area or 250m buffer. The closest RHS site is on Horton Brook approximately 530m downstream of the site. However this was conducted on an impounded reach not thought to be representative of the brook as a whole.

4.2.3 A summary of locations at which RHS were undertaken is provided in Table 2 and is shown in **Error! Reference source not found..**

Table 2: Summary of RHS locations

Ecology survey code	Watercourse	Feature type	Survey date	Approximate Distance from the proposed HEx Depot (m) and orientation
010-RS1-HEX001	GUC, Slough Arm	Canal	25 March 2015	Adjacent to the proposed HEx Depot.
010-RS1-HEX002, 010RS1-HEX003	Horton Brook	Stream	27 March 2015	Within an area of land required for the proposed HEx Depot, and upstream of it.

4.3 Deviations, constraints and limitations

4.3.1 Any local methodological deviations from the FSMS, and the areas to which any such deviations applied, are presented in Table 3.

Table 3: Summary of locations where requirement for RHS identified but no access available for survey

Watercourse	Location	OS grid reference - Start and finish	Feature type and comments	Approximate distance from the proposed HEx Depot (m) and orientation
Horton Brook	Downstream of the proposed HEx Depot	TQ 01814 79923 (upstream), TQ 02460 79523	Access negotiations for land in the southern section of the stream were not finalised at the time of survey	Within an area of land required for the proposed HEx Depot

² RHS is a system devised by the Environment Agency for assessing the character and habitat quality of rivers based on their physical structure.

Watercourse	Location	OS grid reference - Start and finish	Feature type and comments	Approximate distance from the proposed HEx Depot (m) and orientation
		(downstream)		and downstream of it
Horton Brook	Within an area of land required and upstream of the proposed HEx Depot	TQ 01392 80184 (upstream) TQ 01659 80033 (downstream)	Access was denied to the land within the buffer zone containing the stretch of Horton Brook immediately upstream of the GUC; therefore only a short stretch in the most northerly section of the brook at the buffer limits was surveyed	Upstream of the proposed HEx Depot
GUC	Towpath	TQ 00976 79946 (upstream) TQ 01481 80008 (downstream)	The GUC was mainly surveyed from the towpath on the right bank only as no access was possible along most of the left bank.	Within an area of land required for the proposed HEx Depot and upstream and downstream of it

4.4 Baseline

Grand Union Canal, Slough Arm

Predominant valley form

4.4.1 Not applicable (canal).

Number of riffles, pools and point bars

4.4.2 Not applicable (canal).

Artificial features

4.4.3 The canal itself is an artificial water body in that it is a man-made watercourse. One intermediate and two minor bridges are present in the canal stretch surveyed. Three minor outfalls are also present.

Physical attributes

4.4.4 The canal banks are reinforced. In most areas this reinforcement consists of sheet piling, though brickwork is present in places. The channel substrate appears to be primarily silt with overlying pebbles and gravel. It is not known if the bed of the channel itself is reinforced as this was not visible. No flow could be perceived on the canal at the time of survey.

Bank top land use and vegetation structure

4.4.5 The canal tow path runs along the right bank and is used by pedestrians, including dog walkers, cyclists and anglers. Land use within 5m of the right bank top is urban, with uniform mowed grass and short herbs on either side of the towpath and a line of broadleaved trees generally separating this from the urban development (mainly industrial yards). Within 5m of the left bank top land use is improved grassland with

some urban development (a boat yard). The left bank top supports uniform/simple vegetation again with broadleaved trees lining the canal semi-continuously.

Channel vegetation types

- 4.4.6 Marginal emergent monocots are present along much of the canal length and are extensive in places along both banks at the upstream end of the surveyed stretch. They are not, however, present adjacent to the left bank in the middle reach due to the presence of permanently moored residential canal boats. In-channel aquatic vegetation appears limited to low densities of submerged fine-leaved and filamentous algae, though more may have been obscured by the high turbidity of the water. In addition, the timing of the survey (March) may mean that these were under-recorded.

Land use within 50m of bank top

- 4.4.7 Land use within 50m of the left bank top is primarily semi-improved grassland and a golf course, with patches of bracken and scrub. Within 50m of the right bank top is primarily urban development (industrial yards) with an area of rough grassland and scrub and some arable land further downstream. Broadleaf woodland and tall herbs are also present within 50m of both bank tops.

Bank profiles

- 4.4.8 Both banks are completely reinforced; however at the downstream end of the surveyed stretch on the left bank, the reinforced part effectively forms a reinforced bank toe to a higher, more naturalised, vegetated earthen bank.

Extent of trees and associated features

- 4.4.9 Broadleaf trees are semi-continuous along the canal; though are generally set back with limited overhanging branches. The trees do however provide shading of the watercourse from both banks.

Extent of channel and bank features

- 4.4.10 At the time of survey, no flow was perceptible on the canal. Overhanging branches and exposed bankside roots are present in places. The only feature noted in the channel itself was frequent litter. A significant source of litter appears to be the caravan park at Hollow Hill Lane on the left bank, where a number of skips and tipped rubbish heaps were observed.

Channel dimensions

- 4.4.11 Canal width is approximately 12m. Water width is equal to bankfull width. Banktop height is on average 1.25m on both sides, though this increases on the left bank at the downstream end of the surveyed stretch to approximately 4m. Water depth is approximately 0.75m and bed material is unconsolidated.

Features of special interest

- 4.4.12 Some leafy debris (generally debris from last year's emergent reed growth) is present in places and reeds line both sides of the canal in the upstream section.

Choked channel

- 4.4.13 The channel was not choked with vegetation at any point.

Notable nuisance plant species

- 4.4.14 Patches of Japanese knotweed are present along the bank top on both the right and left banks and within 50m of the left bank top in places.

Overall characteristics

- 4.4.15 An oily sheen was observed close to the residential canal boats at one location. This is thought likely to have been an accidental spill or leak from one or more of the boats which are moored in the mid-section of the surveyed stretch, along left bank upstream of the boat yard.
- 4.4.16 Only the left bank at the downstream end of the site is considered to provide suitable habitat for otter; however no evidence of this species was found.
- 4.4.17 The right bank is obviously regularly maintained through mowing of the bank top and cutting of vegetation to allow continued access along the tow path.
- 4.4.18 A gravel path along the left bank in the mid-section allows access to the residential canal boats, which are largely moored to abreast on the left bank. Canal boat gardens occur on the landward side of this path.
- 4.4.19 Anglers were observed on the upstream reach of the survey stretch and Environment Agency records show that GUC (Slough Arm from Cowley to Slough Basin) is a stocked coarse fishery. Fish caught include bream, carp, roach, pike and tench.
- 4.4.20 Moorhen and mallards were observed to be using the canal stretch surveyed and may nest in the canal margins, particularly the upstream end where marginal emergent vegetation is abundant.

Alders

- 4.4.21 Alders were present in places as part of the varied broadleaved wood which fringes the canal. None were noted to be diseased.

Horton Brook upstream of HEx Depot at Langley site

Predominant valley form

- 4.4.22 No valley sides are obvious.

Number of riffles, pools and Point Bars

- 4.4.23 No riffles, pools or point bars area present in the short section surveyed.

Artificial features

- 4.4.24 One double pipe culvert is present at the downstream end of the stretch surveyed. This is a road culvert, running beneath the B470, Langley Park Road. The channel appears to have been straightened and over-deepened in the middle of the section surveyed.

Physical attributes

- 4.4.25 Both banks are earthen and re-sectioned in the mid-section of the survey stretch. The channel substrate is silt and contains much woody debris. Litter is frequent and has accumulated upstream of the culvert and upstream of fallen trees.

Bank top land use and vegetation structure

- 4.4.26 Land use within five metres of the both bank tops is broadleaf wood with an understorey of ivy, nettles and bramble scrub. Bank face vegetation structure is generally either bare or simple and vegetation on both bank tops is simple throughout.

Channel vegetation types

- 4.4.27 With the exception of isolated patches of emergent monocots, no in-channel vegetation was observed during the survey.

Land use within 50m of bank top

- 4.4.28 Horton Brook at this location runs through broadleaf wood with underlying scrub and tall herbs, patches of rank grasses and urban development (roads) and agriculture beyond.

Bank profiles

- 4.4.29 With the exception of steeper banks in the area where re-sectioning has occurred, bank profiles are gentle.

Extent of trees and associated features

- 4.4.30 Broadleaf trees are continuous on the left bank and semi-continuous on the right bank, resulting in extensive shading of the channel with overhanging boughs and exposed bankside and underwater roots. Large woody debris is extensive and fallen willows add habitat diversity.

Extent of channel and bank features

- 4.4.31 The flow in this section of river is smooth, with some areas of rippled flow and areas of marginal deadwater. With the exception of fallen trees, which almost dam the flow in places, no in-channel features are present.

Channel dimensions

- 4.4.32 Bank top height was recorded as approximately 0.5m on the left and 1m on the right. Bankfull height was 0.5m and wetted width approximately 4m. Average water depth was approximately 0.3m and bank to bank width was 5m. Bed material is unconsolidated.

Features of special interest

- 4.4.33 Leafy debris was widespread and debris dams were forming both upstream of the culvert at the downstream end and between two fallen (but still growing) willows at the upstream end.

Choked channel

- 4.4.34 No part of the channel was choked with vegetation at any point.

Notable nuisance plant species

- 4.4.35 No nuisance plant species were recorded.

Overall characteristics

- 4.4.36 The wetted width of the channel is wider where ponding has occurred immediately upstream of the road culvert. The culvert is partially blocked by an accumulation of large woody debris and litter.
- 4.4.37 Muntjac deer tracks were observed in the marginal mud of a ditch flowing into the channel from the left bank. Another ditch flows in from the right bank, which was dry at the time of survey. Trees in the adjacent woodland contained woodpecker holes and red kite were observed flying overhead. Within the brook a large coarse fish (likely tench or a large roach) was observed.

Alders

- 4.4.38 Alders were present in places. None were noted to be diseased.

4.5 Horton Brook within HEx Depot at Langley site

Predominant valley form

- 4.5.1 No valley sides are obvious.

Number of riffles, pools and point bars

- 4.5.2 No riffles, pools or point bars are present in the section surveyed.

Artificial features

- 4.5.3 Three culverts are present; one at the upstream end where the brook runs under the canal; one at the intake to the artificial pond on the right bank and one at the downstream end, where the channel appears to have been straightened and over-deepened. The artificial pond is concrete lined and the intake was dry, indicating connectivity with the river only at times of high flow. A metal fence crosses the river upstream of the culvert by the pond intake. This has caused the build-up of large woody debris and large litter items (e.g. car wheels, planks) upstream of the fence.

Physical attributes

- 4.5.4 Both banks are earthen, though are composed of brick/concrete where they are reinforced at the culvert locations and are re-sectioned at the downstream end. The channel substrate is silt with some underlying pebbly gravel. Litter is frequent.

Bank top land use and vegetation structure

- 4.5.5 Land use within five metres of the left bank tops is broadleaf wood, hawthorn and bramble scrub with rough pasture in places. On the right bank, broadleaf trees, scrub and bramble occur with open water (the artificial pond) at the upstream end. Bank

face vegetation structure is generally either bare or simple and vegetation on both bank tops is generally simple with some uniform areas.

Channel vegetation types

- 4.5.6 Channel vegetation comprises emergent reeds, which are extensive in some areas, some sedges and submerged and emergent broadleaved vegetation in places.

Land use within 50m of bank top

- 4.5.7 Horton Brook at this location runs past urban development (the DB Schenker industrial yard) on the right bank before passing through an area of extensive scattered scrub interspersed with rank grassland and broadleaf wood. Tall herbs also occur in places.

Bank profiles

- 4.5.8 With the exception of steeper banks in the area where re-sectioning has occurred, and reinforced areas by culverts, bank profiles are primarily gently sloping.

Extent of trees and associated features

- 4.5.9 Broadleaf trees are semi-continuous along both banks, resulting in extensive shading of the channel with overhanging branches and exposed bankside and underwater roots. Large woody debris is also present.

Extent of channel and bank features

- 4.5.10 Smooth flows and marginal deadwaters are extensive in the section of channel surveyed, with some areas of rippled flow and no perceptible flow. Vegetated side bars occur in places

Channel dimensions

- 4.5.11 Bank top height was recorded as approximately 0.6 m on the left and 1.2m on the right. Bankfull height was 0.6m and wetted width approximately 2.5m. Average water depth was approximately 0.2m and bank to bank width was 4m. Bed material is unconsolidated.

Features of special interest

- 4.5.12 Leafy debris was widespread and a debris dam was beginning to form between the canal and the metal fence which occurs close to the pond intake.

Choked channel

- 4.5.13 Localised choking of the channel with bulrush occurs, but this is not extensive.

Notable nuisance plant species

- 4.5.14 No nuisance plant species were recorded.

Overall characteristics

- 4.5.15 Mallards were noted in the channel and robins and magpies in the surrounding scrub.
- 4.5.16 Frequent litter occurs in the channel and silt accumulation is high.

Alders

4.5.17 No alders were recorded.

5 River corridor survey

5.1 Introduction

5.1.1 This section of the appendix presents details of baseline information relating to wintering and passage birds for the section of the proposed HEx Depot that will pass through CFA 1 to 6 inclusive.

5.2 Methodology

5.2.1 Details of the standard methodology utilised for RCS surveys are provided in the Technical Note HS2 Ecological Surveys: Field Survey Methods and Standards which is included as an appendix to Volume 1 of the main ES.

5.2.2 A summary of locations at which RCS was undertaken within the HEx Depot at Langley is provided in Table 4.

Table 4: Summary of RCS survey locations

Ecology survey code	Watercourse Name	Feature type	Survey date(s)	Approximate distance from the proposed HEx Depot (m) and orientation
010-RC1-HEx001	GUC, Slough Arm	Canal	25/03/15	Adjacent to the proposed HEx Depot and 500m buffer zone.
010-RC1-HEx002, 010—C1-HEx003	Horton Brook	Stream	27/03/15	Within an area of land required for the proposed HEx depot, and upstream of it.

5.3 Deviations, constraints and limitations

5.3.1 Constraints and limitations to surveys are provided in Table 5.

Table 5: Summary of locations where requirement for RCS identified but no access available for survey

Survey site name	Location	OS grid reference start and finish	Description of proposed survey location	Approximate distance from the proposed HEx Depot
Horton Brook	Within an area of land required for and downstream of proposed HEx Depot	TQ 01814 79923 (upstream), TQ 02460 79523 (downstream)	Access negotiations for land to the southern section of the stream were not finalised at the time of survey	Within the proposed HEx Depot and in downstream buffer area
GUC	Towpath	TQ 00976 79946 (upstream)	The canal was only surveyed from the towpath on the right bank as no access was possible along most of the left bank	Adjacent to the proposed HEx Depot

Survey site name	Location	OS grid reference start and finish	Description of proposed survey location	Approximate distance from the proposed HEx Depot
		TQ 01481 80008 (downstream)		

5.4 Baseline

Grand Union Canal, Slough Arm

- 5.4.1 River corridor habitats identified for along the GUC adjacent to the HEx Depot at Langley site plus buffer are detailed in Table 6 and on maps EC-10-HEx-01 and EC-10-HEx-02.

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Table 6: RCS results for Grand Union Canal Slough Arm

Ecology survey code	010-RC1-HEX001		
Name of watercourse	Grand Union Canal, Slough Arm		
Surveyor(s)	Suzi Coey	Date	25 March 2015
Survey start	09:30	Survey Finish	16:00
Weather conditions (description)	Dry, light wind, sunshine/clouds		
OS Grid Ref (8 digit)	Start Section	TQ 00976 79946	
	End Section	TQ 01481 80008	
Photo Ref(s)	See RHS: 1-7;		
Average width (m)	12m		
Average depth (m)	0.8m		
Brief description of channel	Straight, artificial channel with uniform width and roughly uniform depth. Bankside trees shade approximately 50% of channel. Little woody debris and only a few cobbles/boulders visible; therefore in-channel cover appears limited.		
Base substrate	Mainly silt, overlying gravel/pebbles. Some cobbles and large rocks also present though bed mostly obscured due to turbidity.		
Bank type (include height, angle and extent of erosion)	Left Bank (LB)	90°, sheet piling, brick in places. Height 1.25m. Downstream of the bridge by the boat yard the piling effectively forms a reinforced bank 'toe' as there is a naturalised earth bank on top. The height of the bank in this area rises to 2.75m, then 4m at downstream survey extremity.	
	Right Bank (RB)	90°, sheet piling, brick in places. Height 1.25m. In one localised area tipped debris (rubble/litter) effectively forms the bank material at a slightly less steep angle.	
Notable channel features	LB	Frequent litter. Channel shading from bankside trees, though these are set back and do not generally overhang the channel.	
	RB	Frequent litter. Channel shading from bankside trees, though these do not overhang as they are separated from the channel by the tow path.	
Marginal vegetation (description)	LB	Upper section has fringing reeds- mainly <i>Typha latifolia</i> . The mid-section of the surveyed area has no emergents due to the presence of canal boats, though these reappear further downstream and are again extensive in places.	
	RB	Fringing monocots a mixture of species - mainly <i>Glyceria maxima</i> and <i>Sparganium erectum</i> in the upper section with <i>Phalaris arundacea</i> and <i>Carex riparia</i> . Most common in upstream section but also present and often extensive in downstream buffer area.	
Bank zone habitats	LB	Extensive broadleaved trees; often ivy-covered. Where residential canal boats	

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(description)		occur in the mid-section, planted gardens (some containing cypress trees) occur behind a gravel path, canal-ward of the broadleaved trees.
	RB	Mown grass/short herbs adjacent to towpath with broadleaved trees fringing the canal on the far side of the tow path.
Adjacent land use	LB	Improved grassland behind fringe of broadleaved trees and shrubs/scrub. Dog kennels/gardens upstream of the B470 road bridge. Downstream of this, a boat yard, golf course and caravan park. Fringing trees absent at boat yard location. Rough grassland further downstream.
	RB	Urban development/business park upstream of road bridge and industrial estate downstream of road bridge. Downstream, arable fields and a caravan park. Urban/industrial development further downstream.
Fauna of interest (State LB or RB if specific to single bank)		Moorhen and mallard observed. No evidence of otter or water vole recorded. Artificial bank angle and structure not suitable for otter or water vole, even though foodstuff would be plentiful. Degree of shading high, making it further unsuitable for water vole.
Recreation features		Narrow boats moored by left bank, mainly two abreast, between the B470 and Hollow Hill Lane road bridges. Appear mainly residential. Tow path on right bank used by pedestrians (including dog walkers), cyclists and anglers. Caravan parks either side of the canal with adjacent golf course on left bank.
Existing management		Channel presumably dredged periodically, bank mowing occurs regularly. Bankside and emergent vegetation obviously managed along the stretch.
Observed or potential threats to conservation value (e.g. crop spraying, scrub invasion etc.)		Fuel spillage /leaks from narrow boats (oil sheen). Litter poses threat to wildlife and Japanese knotweed is present in places both in the immediate bank zone on both sides and on land up to 50m from the left bank.
Suggestions for habitat improvement		Eradication of Japanese knotweed. Removal of litter. Plant/encourage spread of emergent vegetation along bare areas of sheet piling. Better control of pollution from narrow boats.

Horton Brook

5.4.2 River corridor habitats identified along Horton Brook where it runs though the HEx Langley site plus upstream buffer are detailed in Table 7 and on maps EC-10-HEX-01 and EC-10-HEX-02.

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Table 7: RCS results for Horton Brook

Ecology survey code	010-RC1-HEX002, 010-RC1-HEX003		
Name of watercourse	Horton Brook		
Surveyor(s)	Suzi Coey	Date	27 March 2015
Survey start	13:03	Survey Finish	14:00
Weather conditions (description)	Dry, light wind, sunny with cloudy spells		
OS Grid Ref (8 digit)	Start Section	TQ0803 8701	
	End Section	TQ 01659 80033	
Photo Ref(s)	As RHS photos; 96-101; 106-122; 125-135		
Average width (m)	3		
Average depth (m)	0.25		
Brief description of channel	Narrow channel, choked with <i>Typha latifolia</i> in places downstream of the canal culvert. Large woody debris is extensive in the northern surveyed section. Four culverts were noted in the accessible parts of the stream; one under the B470; one under that GUC; one by an intake to an artificial pond on the DB Schenker industrial land; and one further downstream.		
Base substrate	Silt, with some underlying pebbly gravel. Leafy and woody debris is common within and overlying the silt and provides some opportunity for crayfish refuge though if present these would most likely be signal crayfish.		
Bank type (include height, angle and extent of erosion)	Left Bank (LB)	Earth bank. Angle varies from approximately 20° to approximately 60°. Downstream often bare with a moss/ivy covering. Rank grasses occur on the bank in places and below the canal bramble scrub overhangs. Limited erosion.	
	Right Bank (RB)	From 45° to 80°. Often bare downstream with a moss/ivy covering. Thick scrub/brambles line the bank in the section of the brook below the canal. Some erosion where banks bare/mossy, with exposed willow roots in places.	
Notable channel features	LB	Litter present in most areas. Wet ditch flows into channel at northern survey extremity.	
	RB	Concrete-lined pond downstream of canal with connection to the Horton Brook, though would only have active water exchange during very high flows. Pond relatively shallow and has become sediment-filled and supports willows, bulrush and soft rush. Litter also present on right bank. Dry ditch joins brook in northernmost surveyed reach.	
Marginal vegetation (Description)	LB	<i>Typha latifolia</i> is common and is spread right across the channel in some places within the proposed HEx Langley site. False fox sedge also present in places. Water mint and <i>Epilobium</i> sp. also occur in patches in both the margins and toward the centre of the channel. Upstream, in the north of the buffer zone, marginal vegetation is limited and restricted to isolated patches of false fox sedge.	

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	RB	<i>Carex remota</i> identified by intake to concrete-lined pond. <i>Typha latifolia</i> common downstream of canal culvert. Upstream, in the north of the buffer zone, marginal vegetation is limited and restricted to isolated patches of <i>Sparganium erectum</i> .
Bank zone habitats (Description)	LB	Extensive hawthorn and bramble scrub downstream of canal culvert. Frequent broad-leaved trees (particularly in the north of the buffer zone) and tall herbs/rank grasses.
	RB	Extensive hawthorn and bramble scrub downstream of canal culvert. Frequent broad-leaved trees (particularly in the north of the buffer zone) and tall herbs/rank grasses. Artificial open water (concrete pond on DB Schenker land within HEx Langley site).
Adjacent land use	LB	Rank neutral semi-improved grassland and tall herbs with scattered scrub. Broadleaved woodland with old commercial greenhouses at the upstream surveyed extent.
	RB	Industrial yard (DB Schenker site) downstream of canal culvert and extensive scrub adjacent to river.
Fauna of interest (State LB or RB if specific to single bank)		No riparian fauna of conservation interest were recorded. Downstream of the canal culvert, mallards were present in the channel and robins and magpies were present in the adjacent scrub. Broadleaved woodland with semi-improved grassland behind at the upstream surveyed extent
Recreation features		A local walker says he uses the rough grassland adjacent to the left bank for camping with his family in the summer. Path alongside brook downstream of the canal project is also evidently used occasionally by dog walkers though does not appear to be a public right of way (PRoW). No recreation in upstream surveyed extent as fenced off private land. Old moat present on land parcel with historic connectivity to brook.
Existing management		No existing management is apparent, though parts of the channel have obviously been deepened/straightened in the past.
Observed or potential threats to conservation value (e.g. crop spraying, scrub invasion etc)		Littering is common and large litter debris is building up in places. Culverts reduce conservation value in places and <i>Typha latifolia</i> is likely to obstruct flow at one point when at the height of its growth in summer. Heavy silting in places.
Suggestions for habitat improvement		Smaller culverts could be removed to open up more natural channel. Removal of litter dams and limited cutting of <i>Typha</i> where it occurs mid channel would allow self-cleansing of the channel and allow free flow and connectivity to be maintained.

6 Amphibians

6.1 Introduction

6.1.1 This section of the appendix presents details of supplementary ecological baseline data relating to amphibians for the amendment.

6.2 Methodology

6.2.1 Details of the standard methodology utilised for amphibian surveys are provided in the Technical Note Ecological Field Survey Methods and Standards which is included within Volume 5: Appendix EC-002-003 of the main ES.

6.3 Deviations, constraints and limitations

6.3.1 A Habitat Suitability Index (HSI) survey was undertaken of nine waterbodies in the land required for the amendment, two west of Langley Park Road, one east of the Canal Wharf Industrial Estate, and six in a field to the west of Thorney Lane South. Access restrictions meant that the survey did not cover the full extent of the development area. Access was not permitted to survey the eastern part of the proposed non-statutory informal nature reserve, and land to the east and south-east of Hollow Hill Lane. There was no access to rail land.

6.3.2 Further waterbodies are present in the land west of Thorney Lane, however these were not surveyed due to time limitations.

6.4 Baseline

Field survey

Habitat suitability index/walkover surveys

6.4.1 Following the completion of 2015 walkover surveys incorporating an HSI survey the pond east of Canal Wharf Industrial Estate and the six ponds in a field to the west of Thorney Lane South all require further surveys. The extensive mosaic of small waterbodies in the proposed mitigation area west of Thorney Lane South require further survey.

Presence/absence and population size class estimate surveys

6.4.2 No presence/absence (p/a) surveys have yet been undertaken.

7 Bats

7.1 Introduction

7.1.1 This section of the appendix presents details of supplementary ecological baseline data relating to bats relevant to the amendment.

7.2 Methodology

- 7.2.1 Details of the standard methodology utilised for bat surveys are provided in the Technical Note Ecological Field Survey Methods and Standards which is included within Volume 5: Appendix EC-002-003 of the main ES.
- 7.2.2 The scoping and desk study exercises undertaken in 2012 and 2013 can be found in Volume 5: Appendix EC-003-001 of the main ES. This baseline report focuses solely on supplementary data collected since the main ES.

7.3 Deviations, constraints and limitations

Trees

- 7.3.1 Trees were subject to initial ground-level bat roost potential surveys only. Access restrictions meant that the survey did not cover the full extent of the development area. Access was not permitted to survey the eastern part of the proposed non-statutory informal nature reserve, and land to the east and south-east of Hollow Hill Lane. There was no access to rail land.

Buildings and structures

- 7.3.2 Four buildings within Thorney Lane Business park were subject to external examination but no other buildings within the business park could be surveyed due to access constraints. Access constraints allowed external examination of buildings at the Canal Wharf industrial estate from PRoW only.

7.4 Baseline

HEx Depot at Langley

Roosting (Trees)

- 7.4.1 Twenty nine trees in the Langley area were subject to initial ground-level bat roost potential assessment, including mature ash (*Fraxinus excelsior*), oak (*Quercus* species) and willow (*Salix* species):
- no confirmed roosts were recorded;
 - eleven trees with high bat roost potential were recorded (these are all willows located at the site west of Thorney Lane North);
 - a further eight trees have moderate bat roosting potential; and
 - the remaining ten trees have low or negligible bat roosting potential.

Roosting (building and structures)

- 7.4.2 All buildings in the Canal Wharf were considered to be of low bat roost potential. All four buildings surveyed in the Thorney Lane Industrial estate were assessed as having low bat roosting potential.

Discussion

- 7.4.3 No bat roosts have been confirmed in the HEx Depot at Langley development area during the surveys. 19 trees with moderate or high roost potential have been

identified. No buildings with moderate or high roost potential have been identified but further survey is required for buildings not accessed at Thorney Lane industrial estate.

8 Badgers

8.1 Introduction

8.1.1 This section of the appendix presents details of supplementary ecological baseline data relating to badgers for the development of the HEx depot at Langley.

8.2 Methodology

8.2.1 Details of the standard methodology utilised for badgers surveys of the proposed HEx Depot at Langley are provided in the SMR Addendum (Volume 5: Appendix CT – 001-000/2 of the main ES).

8.3 Deviations, constraints and limitations

8.3.1 Access restrictions meant that the Phase 1 habitat survey did not cover the full extent of the development area. Access was not permitted to survey the eastern part of the proposed non-statutory informal nature reserve, and land to the east and south-east of Hollow Hill Lane. There was no access to rail land.

8.4 Baseline

Field survey

Walkover surveys

8.4.1 Following the completion of Phase 1 habitat survey evidence of badgers were found in the vicinity of the HEx Depot at Langley and to the north of it.

9 References

Joint Nature Conservation Committee, (2010), Handbook for Phase 1 Habitat Survey – a technique for environmental audit. JNCC, Peterborough.

Arup and URS, (2012), HS2 Ecological Surveys: Field Survey Methods and Standards (unpublished).

SES and AP2 ES Appendix HEX-LQ-001

Environmental topic:	Land Quality	LQ
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

- 1.1.2 The land quality appendix for the proposed Heathrow Express (HEX) depot at Langley comprises:
- detailed risk assessment (Section 2); and
 - references (Section 3).
- 1.1.3 The map referred to throughout the land quality appendix is contained in Maps LQ-01-HEX in the SES and AP2 ES Volume 5, Land Quality Map Book.

2 Detailed risk assessment

2.1 Introduction

- 2.1.1 This appendix presents assessments for areas potentially posing a contaminative risk for the proposed Heathrow Express (Hex) depot, Langley (AP2-000-001) within the study area. For each site the following data is presented:
- baseline risk assessment;
 - construction risk assessment;
 - post-construction risk assessment; and
 - assessment of temporary (construction) and permanent (post-construction) effects.
- 2.1.2 This risk assessment incorporates the following assumptions:
- construction workers are not included within this assessment;
 - higher risk, potentially contaminated sites have been grouped and considered together where appropriate. It should be noted that some parcels of land may have had several land uses from different eras;
 - during construction standard mitigation procedures will be in place in accordance with the draft Code of Construction Practice (CoCP) (Volume 5: Appendix CT-003-000 of the main ES); and
 - during the post-construction condition it is assumed that all required remediation has been undertaken and carried out.
- 2.1.3 The map referred to throughout the land quality appendix is contained in Map LQ-01-HEX in the SES and AP2 ES Volume 5, Land Quality Map Book.

SES and AP2 ES Appendix HEX-LQ-001

Table 1: Detailed risk assessment for areas potentially posing a contaminative risk within the study area

Site reference	Land use	Table reference
HEX-02	Onsite railway land	2, 10, 18, 26
HEX-01	Onsite rail station	2, 10, 18, 26
HEX-08	Former oil depot	3, 11, 19, 27
HEX-23	Offsite historic (Hollow Hill) landfill	4, 12, 20, 28
HEX-24	Offsite historic (Iver) landfill	4, 12, 20, 28
HEX-22	Offsite historic landfill	5, 13, 21, 29
HEX-25	Offsite historic landfill	5, 13, 21, 29
HEX-26	Offsite historic landfill	5, 13, 21, 29
HEX-27	Offsite historic landfill	5, 13, 21, 29
HEX-28	Offsite historic landfill	5, 13, 21, 29
HEX-13	Offsite former chemical works	6, 14, 22, 30
HEX-06	Offsite railway land	7, 15, 23, 31
HEX-15	Offsite railway land (Iver Station)	7, 15, 23, 31
HEX-03	Offsite former brick works	8, 16, 24, 32
HEX-05	Offsite former brick works	8, 16, 24, 32
HEX-09	Offsite former unspecified factory	8, 16, 24, 32
HEX-21	Offsite industrial estate	8, 16, 24, 32
HEX-04	Offsite wharf	8, 16, 24, 32
HEX-10	Offsite wharf	8, 16, 24, 32
HEX-16	Offsite former engineering works	8, 16, 24, 32
HEX-19	Offsite concrete works	9, 17, 25, 33

- 2.1.4 Contaminant types included within the risk assessments are based on the Priority Contaminants Report CLR 8¹. Although withdrawn, this appendix is still commonly used and is considered good practice.
- 2.1.5 The remainder of this appendix presents the risk assessment for the sites set out in Table 2. The following abbreviations are used in these tables:
- CSM - conceptual site model;
 - MTBE - methyl tert butyl ether;
 - PAH - polycyclic aromatic hydrocarbons;
 - PCB - polychlorinated biphenyls; and
 - VOC - volatile organic compounds.

¹ Defra and Environment Agency, (2002), *Potential contaminants for the assessment of land- R&D Publication*, Bristol, Environment Agency.

2.2 Baseline risk assessment

Table 2: Summary CSM for on-site railway land and rail station located at the HEx site at baseline (Area ref: HEx-01, HEx-02)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination in made ground (e.g. ballast): PCB, metals, asbestos, PAH and chlorinated hydrocarbons); potentially low levels of ground gas (methane, carbon dioxide and VOC)	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Unlikely	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	Horton Brook*	Lateral and vertical migration of mobile contamination	Low likelihood	Minor	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Low likelihood	Minor	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

* Pollutant linkage refers to HEx-02 only.

Table 3: Summary CSM for on-site former oil depot located at the HEx site at baseline (Area ref: HEx-o8)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous activities – oil/fuel hydrocarbons, acetones, PAH, aromatic hydrocarbons, chlorinated hydrocarbons, PCB, cyanide, heavy metals and semi-metals and asbestos	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Likely	Medium	Moderate
		Exposure to asphyxiative or explosive gases	Low likelihood	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	Grand Union Canal (GUC)	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Likely	Minor	Moderate/low
		Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 4: Summary CSM for on-site historic landfills located at the HEx site at baseline (Area ref: HEx-23, HEx-24)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous waste streams including asbestos, metals, ground gas (methane, carbon dioxide) and potential leachate generation	Site users (Mansion Lane caravan park visitors)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Low likelihood	Severe	Moderate
	Adjacent site users, such as those within residential properties and workers in the adjacent Mansion Lane caravan park	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contamination	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits	Low likelihood	Severe	Moderate

Table 5: Summary CSM for off-site historic landfills located at the HEx site at baseline (Area ref: HEx-22, HEx-25, HEx-26, HEx-27, HEx-28)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous waste streams including asbestos, metals, ground gas (methane, carbon dioxide) and potential leachate generation	Site users (tip at Langley Southend Farm, Iver golf course or recreational visitors)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Low likelihood	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the adjacent caravan park	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	GUC*	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	Un-named drain(s)**	Lateral and vertical migration of mobile contamination	Low likelihood	Minor	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contamination	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits		Low likelihood	Severe	Moderate	

* Pollutant linkage does not ref to HEx-26.

** Pollutant linkage refers to HEx-22, HEx-27 and HEx -28 only.

Table 6: Summary CSM for off-site former chemical works at baseline (Area ref: HEx –13)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous activities – oil/fuel hydrocarbons, acetones, PAH, aromatic hydrocarbons, chlorinated hydrocarbons, PCB, cyanide, organotin compounds, heavy metals and semi-metals and asbestos	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

Table 7: Summary CSM for off-site railway land at baseline (Area ref: HEx-06, HEx-15)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination in made ground (e.g. ballast): PCB, metals, asbestos, PAH and chlorinated hydrocarbons); potentially low levels of ground gas (methane, carbon dioxide and VOC)	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Unlikely	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 8: Summary CSM for off-site industrial estate, former brick works, unspecified factory, wharf and engineering works at baseline (Area ref: HEx-05, HEx-03, HEx-09, HEx-04, HEx-10, HEx-21, HEx-16)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contamination from ongoing activities and residual contamination in made ground – hydrocarbons including waste oils, heavy metals, arsenic, PCB, phenols, cresols, chlorinated hydrocarbons and asbestos	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours, volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits*	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	GUC**	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

* Pollutant linkage refers to HEx -04 and HEx-10 only

** Pollutant linkage refers to HEx-05, HEx-21, HEx -04 and HEx-10 only

Table 9: Summary CSM for off-site concrete works at baseline (Area ref: HEX-19)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contamination from ongoing activities and residual contamination in made ground – Metals and semi-metals, asbestos, acetones, oil/fuel hydrocarbons, PAHs and PCBs	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours, volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

2.3 Construction risk assessment

Table 10: Summary CSM for on-site railway land and rail station located at the Hex site during construction phase (Area ref: HEx-01, HEx-02).

Source	Receptor	Pathway	Probability	Consequence	Risk with construction phase mitigation
Residual contamination in made ground (e.g. ballast): PCB, metals, asbestos, PAH and chlorinated hydrocarbons); potentially low levels of ground gas (methane, carbon dioxide and VOC)	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Not present during construction		
		Exposure to asphyxiative or explosive gases	Not present during construction		
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	Horton Brook*	Leaching of soluble contaminants or migration of liquid contaminants	Low likelihood	Minor	Low
	River Terrace Deposits*	Lateral and vertical migration of mobile contaminants	Low likelihood	Minor	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

* Pollutant linkage refers to HEx-02 only.

Table 11: Summary CSM for on-site former oil depot located at the HEx during construction phase (Area ref: HEx-o8)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous activities – including hydrocarbons including waste oils and petrol and diesel, heavy metals, PAH, chlorinated aliphatic compounds, organolead compounds, MTBE.	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Not present during construction		
		Exposure to asphyxiative or explosive gases	Not present during construction		
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	GUC	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Likely	Minor	Moderate/low
		Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 12: Summary CSM for on-site historic landfills located at the HEx site during construction (Area ref: HEx-23, HEx-24)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous waste streams including asbestos, metals, ground gas (methane, carbon dioxide) and potential leachate generation	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Not present during construction		
		Exposure to asphyxiative or explosive gases	Not present during construction		
	Adjacent site users, such as those within residential properties and workers in the adjacent Mansion Lane caravan park	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contamination	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits	Low likelihood	Severe	Moderate

Table 13: Summary CSM for off-site historic landfills located at the HEx site during construction (Area ref: HEx-22, HEx-25, HEx-26, HEx-27, HEx-28)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous waste streams including asbestos, metals, ground gas (methane, carbon dioxide) and potential leachate generation	Site users (tip at Langley Southend Farm, Iver golf course or recreational visitors)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Low likelihood	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the adjacent Mansion Lane caravan park	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	GUC*	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	Un-named drain(s)**	Lateral and vertical migration of mobile contamination	Low likelihood	Minor	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contamination	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits		Low likelihood	Severe	Moderate	

* Pollutant linkage does not ref to HEx - 26.

** Pollutant linkage refers to HEx-22, HEx-27 and HEx-28 only.

Table 14: Summary CSM for off-site former chemical works during construction (Area ref: HEx -13)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous activities – oil/fuel hydrocarbons, acetones, PAH, aromatic hydrocarbons, chlorinated hydrocarbons, PCB, cyanide, organotin compounds, heavy metals and semi-metals and asbestos	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

Table 15: Summary CSM for off-site railway land during construction (Area ref: HEx -06, HEx-15)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination in made ground (e.g. ballast): PCB, metals, asbestos, PAH and chlorinated hydrocarbons); potentially low levels of ground gas (methane, carbon dioxide and VOC)	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Unlikely	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 16: Summary CSM for an industrial estate, off-site former brick works, unspecified factory, wharf and engineering works during construction (Area ref: HEx-05, HEx-03, HEx-09, HEx-04, HEx-10, HEx-21, HEx-16)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contamination from ongoing activities and residual contamination in made ground – hydrocarbons including waste oils, heavy metals, arsenic, PCB, phenols, cresols, chlorinated hydrocarbons and asbestos	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours, volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits*	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	GUC**	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

* Pollutant linkage refers to HEx -04 and HEx-10 only

** Pollutant linkage refers to HEx-05, HEx-21, HEx-04 and HEx-10 only

Table 17: Summary CSM for off-site concrete works during construction (Area ref: HEx-19)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contamination from ongoing activities and residual contamination in made ground – Metals and semi-metals, asbestos, acetones, oil/fuel hydrocarbons, PAHs and PCBs	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours, volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

2.4 Post-construction risk assessment

Table 18: Summary CSM for on-site railway land and rail station located at the HEx site during post-construction phase (Area ref: HEx-01, HEx-02)

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Residual contamination in made ground (e.g. ballast): PCB, metals, asbestos, PAH and chlorinated hydrocarbons); potentially low levels of ground gas (methane, carbon dioxide and VOC)	Site end users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Minor	Very low
		Exposure to asphyxiative or explosive gases	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	Horton Brook*	Lateral and vertical migration of mobile contamination	Unlikely	Minor	Very low
	River Terrace Deposits*	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Unlikely	Minor	Very low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Unlikely	Medium	Low

* Pollutant linkage refers to HEx-02 only.

Table 19: Summary CSM for on-site former oil depot located at the HEx site during post-construction phase (Area ref: HEx-o8)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous activities – oil/fuel hydrocarbons, acetones, PAH, aromatic hydrocarbons, chlorinated hydrocarbons, PCB, cyanide, heavy metals and semi-metals and asbestos	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
		Exposure to asphyxiative or explosive gases	Unlikely	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Unlikely	Minor	Very low
		Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 20: Summary CSM for on-site historic landfills located at the HEX site during post-construction (Area ref: HEX-23, HEX-24)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous waste streams including asbestos, metals, ground gas (methane, carbon dioxide) and potential leachate generation	Site users (rail maintenance staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
		Exposure to asphyxiative or explosive gases	Unlikely	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the adjacent Mansion Lane caravan park	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits	Lateral and vertical migration of mobile contamination	Unlikely	Minor	Very low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Unlikely	Minor	Very low
		Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 21: Summary CSM for off-site historic landfills located at the HEx site during post-construction (Area ref: HEx-22, HEx-25, HEx-26, HEx-27, HEx-28)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous waste streams including asbestos, metals, ground gas (methane, carbon dioxide) and potential leachate generation	Site users (tip, golf course or recreational visitors)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Low likelihood	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the adjacent Mansion Lane caravan park	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Low likelihood	Minor	Low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	GUC*	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	Un-named drain(s)**	Lateral and vertical migration of mobile contamination	Low likelihood	Minor	Low
	River Terrace Deposits	Lateral and vertical migration of mobile contamination	Likely	Minor	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
Migration of hazardous gas (potentially asphyxiative or explosive gases) to confined spaces via permeable strata or conduits		Low likelihood	Severe	Moderate	

* Pollutant linkage does not ref to HEx-26.

** Pollutant linkage refers to HEx-22, HEx-27 and HEx-28 only.

Table 22: Summary CSM for off-site former chemical works during post-construction (Area ref: HEx-13)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination from previous activities – oil/fuel hydrocarbons, acetones, PAH, aromatic hydrocarbons, chlorinated hydrocarbons, PCB, cyanide, organotin compounds, heavy metals and semi-metals and asbestos	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Low likelihood	Medium	Moderate/low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

Table 23: Summary CSM for off-site railway land during post-construction (Area ref: HEx-06, HEx-15)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Residual contamination in made ground (e.g. ballast): PCB, metals, asbestos, PAH and chlorinated hydrocarbons); potentially low levels of ground gas (methane, carbon dioxide and VOC)	Site users (rail staff)	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Low likelihood	Medium	Moderate/low
		Exposure to asphyxiative or explosive gases	Unlikely	Severe	Moderate/low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas	Off-site migration of soil vapours and volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Low likelihood	Minor	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low
		Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Unlikely	Severe	Moderate/low

Table 24: Summary CSM for an industrial estate, off-site former brick works, unspecified factory, wharf and engineering works during post-construction (Area ref: HEx-05, HEx-03, HEx-09, HEx-10, HEx-21, HEx-04, HEx-16)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contamination from ongoing activities and residual contamination in made ground – hydrocarbons including waste oils, heavy metals, arsenic, PCB, phenols, cresols, chlorinated hydrocarbons and asbestos	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours, volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits*	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	GUC**	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

* Pollutant linkage refers to HEx -04 and HEx-10 only

** Pollutant linkage refers to HEx-05, HEx-21, HEx-04 and HEx-10 only

Table 25: Summary CSM for off-site concrete works during post-construction (Area ref: HEx-19)

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contamination from ongoing activities and residual contamination in made ground – Metals and semi-metals, asbestos, acetones, oil/fuel hydrocarbons, PAHs and PCBs	Site users - workers in businesses	Human uptake through: dermal contact, ingestion or inhalation of soil/dust, volatilised compounds	Unlikely	Medium	Low
	Adjacent site users, such as those within residential properties and workers in the surrounding light industrial/residential areas and rail areas	Off-site migration of soil vapours, volatile organic compounds (by diffusion or due to wind)	Unlikely	Minor	Very low
		Off-site migration of wind-blown dust	Unlikely	Minor	Very low
	River Terrace Deposits	Lateral and vertical migration of mobile contaminants	Unlikely	Minor	Very low
	GUC	Lateral and vertical migration of mobile contamination	Unlikely	Medium	Low
	Buildings/underground structures and services	Direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low likelihood	Minor	Low

2.5 Assessment of temporary (construction) and permanent (post-construction) effects

Table 26: Significance of effect assessment for on-site railway land and rail station (Area ref: HEx-01, HEx-02).

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Moderate/low	N/A	Very low	Negligible	Moderate beneficial
Exposure of on-site humans to asphyxiative or explosive gases	Moderate/low	N/A	Low	Negligible	Moderate beneficial
Exposure of adjacent human receptors to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Very low	Negligible	Minor beneficial
Lateral and vertical migration of mobile contamination into the Horton Brook	Low	Low	Low	Negligible	Negligible
Leaching of soluble contaminants or migration of liquid contaminants into River Terrace Deposits	Low	Low	Low	Negligible	Negligible
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Very low	Negligible	Minor beneficial
Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Moderate/low	Moderate/low	Low	Negligible	Minor beneficial
Overall significance				Negligible effect	Minor to moderate beneficial effect

Table 27: Significance of effect assessment for former on-site oil depot at the HEx site (Area ref: HEx-o8)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Moderate	N/A	Low	Negligible	Moderate beneficial
Exposure of on-site humans to asphyxiative or explosive gases	Moderate/low	N/A	Moderate/low	Negligible	Minor beneficial
Exposure of adjacent human receptors to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Low	Low	Very low	Negligible	Minor beneficial
Exposure of adjacent human receptors to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Very low	Negligible	Minor beneficial
Lateral and vertical migration of mobile contamination into the GUC	Moderate/low	Moderate/low	Low	Negligible	Minor beneficial
Leaching of soluble contaminants or migration of liquid contaminants into River Terrace Deposits	Moderate/low	Moderate/low	Low	Negligible	Minor beneficial
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Moderate/low	Moderate/low	Very low	Negligible	Moderate beneficial
Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Moderate/low	Moderate/low	Moderate/low	Negligible	Minor beneficial
Overall significance				Negligible effect	Minor to moderate beneficial effect

Table 28: Significance of effect assessment for on-site historic landfills located at the HEx site (Area ref: HEx-23, HEx-24)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Moderate/low	N/A	Low	Negligible	Negligible
Exposure of on-site humans to asphyxiative or explosive gases	Moderate	N/A	Moderate/low	Negligible	Negligible
Exposure of adjacent human receptors to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Low	Low	Very low	Negligible	Minor beneficial
Exposure of adjacent human receptors to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Very low	Negligible	Minor beneficial
Lateral and vertical migration of mobile contamination into the River Terrace Deposits	Moderate/low	Moderate/low	Low	Negligible	Minor beneficial
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Very low	Negligible	Minor beneficial
Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Moderate	Moderate	Moderate/low	Negligible	Minor beneficial
Overall significance				Negligible effect	Minor beneficial effect

Table 29: Significance of effect assessment for off-site historic landfills located at the HEx site (Area ref: HEx-22, HEx-25, HEx-26, HEx-27, HEx-28)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Exposure of on-site humans to asphyxiative or explosive gases	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Exposure of adjacent human receptors to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the GUC	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the un-named drains	Low	Low	Low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the River Terrace Deposits	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Low	Negligible	Negligible
Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Moderate	Moderate	Moderate	Negligible	Negligible
Overall significance				Negligible effect	Negligible effect

Table 30: Significance of effect assessment for former offsite chemical works (Area ref: HEx-13)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Low	Low	Low	Negligible	Minor beneficial
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Very low	Very low	Very low	Negligible	Minor beneficial
Exposure of adjacent human receptors (in commercial properties) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Very low	Very low	Very low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the GUC	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Low	Negligible	Minor beneficial
Overall significance				Negligible effect	Negligible effect

Table 31: Significance of effect assessment for off-site railway land (Area ref: HEx-06, HEx-15)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Exposure of on-site humans to contamination by inhalation of ground gas and volatile vapours from contaminated soil/water	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (in commercial properties) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Low	Low	Low	Negligible	Negligible
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Low	Negligible	Negligible
Migration of hazardous gas and vapours to confined spaces via permeable strata or conduits	Moderate/low	Moderate/low	Moderate/low	Negligible	Negligible
Overall significance				Negligible effect	Negligible effect

Table 32: Significance of effect assessment for former offsite brick works, unspecified factory, wharf and engineering works during post-construction (Area ref: HEx-05, HEx-03, HEx-09, HEx-21, HEx--04, HEx-10, HEx-16)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (in commercial properties) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Very low	Very low	Very low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the River Terrace Deposits	Very low	Very low	Very low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the GUC	Low	Low	Low	Negligible	Negligible
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Low	Negligible	Negligible
Overall significance				Negligible effect	Negligible effect

Table 33: Significance of effect assessment for off-site concrete works (Area ref: HEx-19)

Contaminant linkage	Baseline	Construction	Post-construction	Construction effect	Post-construction effect
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of contaminants in soil, soil-derived dust or contaminated water	Low	Low	Low	Negligible	Negligible
Exposure of adjacent human receptors (residents) to contamination by inhalation of migrating ground gas and volatile vapours from contaminated soil/water	Very low	Very low	Very low	Negligible	Negligible
Exposure of adjacent human receptors (in commercial properties) to contamination by direct contact, ingestion and inhalation of contaminants in windblown, soil-derived dust	Very low	Very low	Very low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the River Terrace Deposits	Very low	Very low	Very low	Negligible	Negligible
Lateral and vertical migration of mobile contamination into the GUC	Low	Low	Low	Negligible	Negligible
Migration of contamination and direct contact of fabric of buildings and services (e.g. foundations, and water supply pipes)	Low	Low	Low	Negligible	Negligible
Overall significance				Negligible effect	Negligible effect

3 References

Defra and Environment Agency, (2002), Potential contaminants for the assessment of land- R&D Publication, Bristol, Environment Agency.

Environmental Protection Act 1990, Part IIA, Introduced in England on 1 April 2000, London, Her Majesty's Stationary Office.

SES and AP2 ES Appendix HEX-LV-001

Environmental topic:	Landscape and Visual	LV
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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1 Introduction

- 1.1.1 This appendix provides a the baseline information for the proposed Heathrow Express (HEX) Depot at Langley in Slough as part of the Supplementary Environmental Statement (SES) and the Additional Provision 2 Environmental Statement (AP2 ES). This details the baseline information for all effected landscape character areas (LCA) and represented viewpoints within the defined study area for the proposed HEX Depot.
- 1.1.2 AP2 ES Map series LV-02, LV-03 and LV-04, as referred to throughout this landscape and visual assessment appendix, are contained in Volume 5, Map Book Landscape and visual assessment and should be read in conjunction with the original Volume 5 Landscape and Visual Assessment Map Book.

Part 1 Environmental baseline report

2 Introduction

- 2.1.1 This section describes the baseline for new LCAs and new visual assessment viewpoints located within the study area for the proposed HEX Depot, which have been identified to inform the SES and AP2 ES. A summary of the landscape and visual baseline is provided in Volume 4 of this SES and AP2 ES. The LCA Maps LV-02-003 to LV-02-004 (Volume 5 of this SES and AP2 ES, Landscape and Visual Assessment Map Book), which are based on an aerial photograph, also help to provide an overview of the character of the area, illustrating the pattern of development, distribution of open spaces and spread of vegetation.
- 2.1.2 This section is organised as follows:
- information on each new LCA identified within the study area, including a description of the area and an analysis of the condition, tranquillity, value and sensitivity of each LCA. These are ordered from east to west alongside the proposed HEX Depot; and
 - information on the nature of the existing views towards the proposed HEX Depot from representative visual assessment viewpoints identified to inform the SES AP2 ES, during both winter and summer, and daytime and night-time where relevant. These are ordered from east to west alongside the proposed HEX Depot.

3 Landscape character assessment

- 3.1.1 Descriptions of new LCAs identified within the study area for the SES and AP2 ES are provided below. The LCAs are shown on Map LV-02-HEX (Volume 5 of this SES and AP2 ES). A summary description of the LCAs most likely to be significantly affected is included in the SES and AP2 ES Volume 4, Off-route effects, Section 3.

Iver Heath Mixed Use Terrace (south) LCA

The LCA is informed by the Iver Heath Mixed Use Terrace LCA as described in the South Bucks District LCA¹. The northern section of this LCA is a more harmonious landscape comprising small to medium sized arable fields usually bordered by hedgerows and trees, whereas the southern section comprises large open arable fields between settlements, bordered by occasional hedgerows and trees. The LCA is located within the London Metropolitan Green Belt and the Colne Valley Regional Park.

Landscape condition

The Iver Heath Mixed Use Terrace (south) LCA occupies the 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 are predominantly connected to agriculture. Therefore, the Iver Heath Mixed Use Terrace (south) LCA is assessed as being in fair condition.

Tranquillity

The landscape is divided by numerous rural roads and dissected east to west by the Great Western Main Line (GWML) and the Grand Union Canal (GUC). The M25 is audible and visible, although located to the east outside 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.

Landscape value

The fair condition of the landscape, medium tranquillity and location within the green belt indicate that this is a landscape assessed as being of value at a regional level.

Sensitivity

Due to the fair condition, medium tranquillity and regional value, this LCA is assessed as being of medium sensitivity to change.

Figure 7: Iver Heath Mixed Use Terrace (south) LCA Date taken: 18 February 2015. Nikon D3200 35mm lens



¹ South Bucks Landscape character assessment, 2011. <http://www.buckscc.gov.uk/environment/heritage-ecology/landscape/buckinghamshire-landscape-character-assessment/south-bucks-district-landscape-character-assessment/>.

Stoke and Langley Park Lowland Fringe LCA

The LCA occupies the transitional lowland area. The landscape is open and low lying, rising steadily towards the north where it becomes more undulating. Small pockets of woodland are well dispersed, with tree cover largely associated with designed landscapes, specifically parkland and golf courses. The LCA is located predominantly within the London Metropolitan Green Belt.

Landscape condition

The mixed land use has a strong human influence through the dispersed settlements through the area. Within the predominantly rural landscape the Iver Golf Course and the Grade II Listed Langley Park, both provide woodland cover and a sense of enclosure. The managed and maintained elements within the LCA are predominantly connected to agriculture. Therefore, the Stoke and Langley Park Lowland Fringe LCA is assessed as being in fair condition.

Tranquillity

The GWML is to the south in the adjacent Slough Urban LCA. Several B roads, and minor A roads traverse the landscape, connecting settlements. Due to the presence of these infrastructure elements in a rural setting, the overall level of tranquillity is considered to be medium.

Landscape value

The fair condition of the landscape, medium tranquillity and location within the green belt indicate that this is a landscape assessed as being of value at a regional level.

Sensitivity

Due to the fair condition, medium tranquillity and regional value, this LCA is assessed as being of high sensitivity to change

Figure 8: Stoke and Langley Park LCA Date taken: 18 February 2015. Nikon D3200 35mm lens



Slough Urban LCA

The LCA is located on the north eastern edge of the settlement of Slough. To the north of the GWML is the Canal Wharf Industrial Estate and Langley Business Park which forms the northern edge of the LCA.

Landscape condition

To the south of the GWML development consists predominantly of 20th century residential housing. There are a number of schools in the area including Upton Court Grammar School, St Bernard's Catholic Grammar School, Ryvers Primary School and Parlaunt Park Primary School. There are several conservation areas within the Slough Urban LCA which include Colnbrook, St. Bernard's School, St Mary's Church, Sussex Place/ Clifton Road and Upton Park Village. The streets and other elements within the LCA are relatively well-maintained and the landscape condition is assessed as being fair.

Tranquillity

The GWML runs along the northern edge of the LCA. Numerous roads connect the built settlement, with; the larger A4 road and the M4 located to the south of the LCA. Due to the presence of transport infrastructure and the urban nature of the LCA, the overall level of tranquillity is considered to be low.

Landscape value

The fair condition of the landscape, low and lack of designations indicate that this is a landscape assessed as being of local value.

Sensitivity

Due to the fair condition, low tranquillity and local value, this LCA is assessed as being of low sensitivity to change

Figure 9: Slough Urban LCA Date taken: 18 February 2015, Nikon D3200 35mm lens



4 Visual baseline

- 4.1.1 Descriptions of the new representative viewpoints identified to inform the SES and AP2 ES are provided below. The viewpoints are shown on maps LV-03-HEx and LV-04-HEx (Volume 5 of this SES and AP2 ES). For each viewpoint, the first part of the baseline description relates to the view during winter, the second part relates to the summer view for viewpoints considered in the operational assessment and, for residential areas, the third part relates to the view at night-time. However, due to the timescale of the assessment no summer views were possible.
- 4.1.2 Photographs have been included to represent the view from visual receptors during winter and, where relevant, summer. For some visual receptors, no appropriate location from which to capture a representative photograph of the view was available, therefore no photograph has been included and the assessment has been undertaken based on professional judgement.
- 4.1.3 The viewpoint number identifies the viewpoint locations which are shown on maps LV-03-HEx and LV-04-HEx (Volume 5 of this SES and AP2 ES). In each case, the middle number (xxx.x.xxx) identifies the type of receptor as follows:
- protected views - these relate to those viewpoints, panoramas and viewing corridors that have been designated by local planning authorities, county councils or other relevant stakeholders. Protected views have a high sensitivity to change. None of these receptor types have been identified within the study area;
 - residential views – these have a high sensitivity to change, as attention is often focused on the landscape surrounding the property, rather than on another focused activity (as will be the case in predominantly employment or industrial areas);
 - recreational views – these receptors (apart from those engaged in active sports) generally have a high sensitivity to change, as attention is focused on enjoyment of the landscape. Tourists engaged in activities whereby attention is focused on the surrounding landscape or townscape also have a high sensitivity to change;
 - transport views - travel through an area is often the means by which the greatest numbers of people view the landscape. Because of the glimpsed nature of the view from trains or road vehicles, people travelling through an area on main roads have a low sensitivity to change. People travelling through urban areas (including pedestrians where the focus is not in recreation) also generally have a low sensitivity to change;
 - hotels and healthcare institutions - people staying in hotels and healthcare institutions have periods of time when their attention may be focused on the landscape, whilst at other times attention is more likely to be focused on other activities. Based on the level of interaction with the surrounding landscape, these receptors have a medium sensitivity to change. None of these receptor types have been identified within the study area or, where present, they have been represented by other viewpoint categories;
 - employment - people at work and within educational institutions are the least sensitive receptors, as their attention is likely to be focused on their work activity. These receptors have a low sensitivity to change; and
 - active sports - people engaged in active sports have a low sensitivity to change as their attention is likely to be focused on their activity.

Viewpoint HEx.3.001: View south-west from public right of way -IVE/13/1

This viewpoint is representative of views at ground level from public right of way (PRoW) – IVE/13/1, which runs from the rear of properties on Addison Close to the Ridgeway Trading Estate linking into PRoW IVE/15/2 and IVE/15/3.

Winter

This view (illustrated in Figure 4) is open in the foreground looking south. In the middle ground, the northern edge of the Ridgeway Trading Estate and associated planting are visible. To the right of the view, looking south-west, the view is screened in the middle ground by a hedgerow running along the access road to Unit 5C of the trading estate. Pylons are visible in the background.

Summer

In summer, the vegetation along the northern edge of the Ridgeway Trading Estate, in the middle ground of the view will be more prominent but will not enclose the view.

Figure 10: Viewpoint HEx.3.001 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.4.002: View west from Iver Railway Station

This viewpoint is representative of views from a footbridge over the GWML and platforms at Iver Railway Station.

Winter

In the foreground, the view (illustrated in Figure 5) is open to the west along the GWML railway corridor, with unobstructed views of the platforms. In the middle ground, to the north-west, vegetation running along the boundary of the railway line forms a visual barrier, with glimpsed views of pylons in the background of the view. To the west there are glimpsed views of the buildings and vehicles located within the Thorney Lane Business Park in the background of the view.

Summer

In summer the existing tree cover form a dense wooded screen enclosing the views to the north and west.

Figure 11: Viewpoint HEx.4.002 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.2.003: View north-west from adjacent to St. Andrews United Reformed Church

This viewpoint is representative of views at ground level from residences to the west of the Richings Park residential estate.

Winter

The view (illustrated in Figure 6) looking north-west towards the proposed HEx Depot along a farm track. In the foreground, there are partial views of an open field between areas of vegetation. In the middle ground, there is a dense belt of vegetation running along a field boundary, which screens views beyond. However, there may be views from the upper floors of buildings and/or views of elements above the planting belt such as pylons.

Summer

In summer, the existing hedgerow and trees filter views in the foreground and knit together to form a dense wooded background.

Figure 12: Viewpoint HEx.2.003 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



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

This viewpoint is representative of views at ground level from residences to the west of the Richings Park residential estate.

Winter

This view (illustrated in Figure 7) is a panorama looking north towards the proposed HEx Depot. In the foreground and middle ground, the view is open across the arable fields. In the background of the view, the GWML and associated vegetation is visible, as are the pylons to the north of the Grand Union Canal. Views of the proposed HEx Depot will be possible in the background beyond the existing vegetation.

Summer

In summer, the open nature of the fore ground and middle ground of the view is unchanged. The tree cover associated with the GWML some provides additional screening to trains using the line, Trees along the drain to the left of the view form a more dense screen.

Figure 13: Viewpoint HEX.3.004 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.2.005: View north from Parlaunt Road, Langley

This viewpoint is representative of views at ground level from two storey residences on Parlaunt Road, taken from a public footway to the front of the properties.

Winter

The view is open in the foreground and middle ground (illustrated in Figure 8) looking across Parlaunt Road and the neighbouring pastureland. On the left of the view, houses on Market Lane are visible in the middle ground. Beyond the pasture, to the north west, there are views of the properties on the northern end of Market Lane. To the north there are partial views of the GWML railway corridor through the planting on the southern boundary of the railway embankments.

Summer

The open nature of the view is largely unchanged in summer but the vegetation associated with the GWML and the watercourse will form a denser screen in the background of the view.

Figure 14: Viewpoint HEx.2.005 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



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

This viewpoint is representative of views from the rear of properties on Southwold Spur and properties facing Market Lane looking north-east and east.

Winter

This view (illustrated in Figure 9) towards the proposed HEx Depot is over arable fields. In the middle ground. Views are partially screened by vegetation on field boundaries and along the railway corridor, which is visible through this vegetation. In the background of the view there are glimpsed views of the Mansion Lane Caravan Park and Thorney Lane Business Park above and through vegetation.

Summer

In summer, the existing tree cover provides a denser screen to the GWML and additional structure to the semi ornamental planting along Market Lane in the foreground.

Figure 15: Viewpoint HEx.2.006 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



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

This viewpoint is representative of views at ground level from residences on Mead Avenue and Maplin Park, taken from a car park to the rear of properties.

Winter

This image represents the view (illustrated in Figure 10) from the ground floor of two and three storey residential properties on Mead Avenue and Maplin Park. The southern side of the GWML railway corridor can be seen in the foreground. There are glimpsed longer views through the planting along the corridor.

Summer

In summer the existing vegetation forms a dense screen in the foreground of the view.

Figure 16: Viewpoint HEx.2.007 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.6.008: View north from Langley Business Centre

This viewpoint is representative of views from commercial properties within Langley Business Centre facing north and north-east towards the Great Western Main Line (GWML).

Due to no publically accessible location being available, it has not been possible to capture a photograph from this viewpoint.

Winter

This view from commercial properties on Langley Business Park is largely open in foreground and looks directly towards the GWML, which is prominent in the view. In the middle ground of the view the opposing Canal Wharf Industrial Estate is visible, together with some boundary vegetation screening the majority of views beyond.

Summer

In summer, the existing tree cover forms dense screens along the GWML and Station Road. Planting within the business park tends to provide less screening.

Viewpoint HEx.4.009: View east from commercial properties in Langley Business Park

This viewpoint is representative of views from two storey commercial properties in Langley Business Park, taken from ground level from a car park within the business park.

Winter

This view (illustrated in Figure 11) from two storey properties in Langley Business Park is open in foreground and looks directly along Station Approach. In the middle ground of the view, Langley Station and the industrial properties on Canal Wharf Industrial Estate are prominent in the view. These screen the majority of longer views except along Station Approach, where there are glimpses of the railway line and railway corridor vegetation.

Summer

In summer, the existing tree cover associated with Langley Station and car park partially screen views towards the station. Other tree cover within the business park is more scattered and there is limited change in the overall view between winter and summer.

Figure 17: Viewpoint HEx.4.009 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



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

This viewpoint is representative of views from two storey commercial properties in Langley Business Park, taken from ground level from a car park within the business park.

Winter

The foreground view is of the towpath and the vegetation growing along the canal corridor. The vegetation cover varies along the length of the canal. In the middle ground views over the intervening arable field towards the scrubland which together with scattered tree cover forms the background of the view. Other locations along the canal views are filtered through existing canal-side vegetation.

Summer

In summer, the scattered tree cover and scrub in the background of the view form a dense wooded appearance. The tree cover along the canal filters views to the south.

Figure 18: Viewpoint HEx.2.010 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.7.011: View south from Hollow Hill Lane, adjacent to Iver Golf Club

This viewpoint is representative of views from Iver golf course and Dudley Wharf.

Winter

This view looking south along Hollow Hill Lane is open in the foreground and middle ground, across Iver Golf Course (illustrated in Figure 13). Chain link fencing along Hollow Hill Lane, pylons and telegraph poles are also evident in the foreground. Vegetation on the golf course and planting along Hollow Hill Lane is visible in the middle ground, with the trees lining the Grand Union Canal in the background.

Summer

In summer the scattered golf course planting will be more prominent, partially enclosing the view.

Figure 19: Viewpoint HEx.7.011 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.4.012: View west from Hollow Hill Lane

This viewpoint is representative of views from vehicles on Hollow Hill Lane, Hollow Hill Lane Bridge and Mansion Lane Caravan Park looking west towards the Grand Union Canal, railway and northern boundary of Langley.

Winter

This view (illustrated in Figure 14) is from the Hollow Hill Lane adjacent to the proposed HEx Depot. In the foreground and middle ground, the view is open across the neighbouring fields. In the background of the view, vegetation along the GWML, Grand Union Canal, railway corridor and northern edge of Langley is evident, screening the majority of longer views, although there are glimpsed views of the top of buildings located on Maplin Park and Mead Avenue, Langley. The railway bridge is evident to the east of the view.

Summer

In summer, the existing vegetation along the GWML will be more prominent forming a stronger horizon in the view.

Figure 20: Viewpoint HEx.4.012 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Viewpoint HEx.2.013: View south from Mansion Lane Caravan Park

This viewpoint is representative of views from residents of Mansion Lane Caravan Park.

Due to no publically accessible location being available, it has not been possible to capture a photograph from this viewpoint.

Winter

This view is generally screened in the foreground by vegetation and fencing enclosing the caravan park boundary. Although, there may be glimpses of vehicles on Hollow Hill Lane above the boundary screening.

Summer

The boundary planting round the site will provide greater screening in summer together with the trees along Hollow Hill Lane.

Viewpoint HEx.6.014: View west from Thorney Lane Business Park

This viewpoint is representative of views from workers within Thorney Lane Business Park.

Due to no publically accessible location being available, it has not been possible to capture a photograph from this viewpoint.

Winter

This view from the Thorney Lane Business Park will be largely screened by boundary vegetation in the foreground of the view. There may be glimpsed views through gaps in vegetation of the neighbouring fields and GWML.

Summer

Boundary planting will be more prominent in summer.

Viewpoint HEx.2.015: View south-west from cottages on Mansion Lane

This viewpoint is representative of views at ground level from two-storey residential properties on Mansion Lane, taken from a public footway to the front of the properties.

Winter

The view (illustrated in Figure 15) is open in the foreground and middle ground of the view across neighbouring arable fields. To the east, the view is framed by existing vegetation along the edge of Mansion Lane. In the background of the view, pylons form notable elements in the view running from west to east, whilst vegetation along the boundary of the Grand Union Canal is visible, screening any views beyond.

Summer

In summer, the hedgerow trees along field boundaries are more prominent particularly along the Grand Union Canal and along sections of Mansion Lane.

Figure 21: Viewpoint HEx.2.015 – winter view Date taken: 18 February 2015. Nikon D3200 35mm lens (stitched panorama)



Part 2 Assessment matrices

5 Landscape assessment matrix

5.1.1 Table 1 summarises the assessment findings for all the LCAs identified within the study area. These are ordered from south to north along the route of the Proposed Scheme. The assessment of significant effects is presented in Volume 2. Non-significant effects (minor or negligible) are summarised in Part 3.

Table 1 : Landscape assessment matrix

Landscape character area	Construction	Operation year 1 (2026)	Operation year 15 (2041)	Operation year 60 (2086)
Iver Heath Mixed Use Terrace (south) LCA	Major adverse	Moderate adverse	Minor adverse	Minor adverse
Stoke and Langley Park Lowland Fringe LCA	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Slough Urban LCA	Minor adverse	Minor adverse	Minor adverse	Minor adverse

6 Visual assessment matrix

6.1.1 Table 2 summarises the assessment of significance for all the representative viewpoints identified within the study area. These are ordered from south to north along the route of the Proposed Scheme. The assessment of significant effects is presented in Volume 2. Not significant effects (minor or negligible) are summarised in Part 4 of this Volume. For some viewpoints it has been identified that no further assessment is required in one of the assessment years/seasons. This is on the basis that, through application of professional judgement, it has been determined no significant effects will occur and therefore no further assessment has been undertaken. The night-time assessment has only been undertaken for residential, hotel and healthcare receptors with a view of proposed continuous lighting during either construction or operation.

Table 2 : Visual assessment matrix

Viewpoints		Construction		Operation year 1 (2026)			Operation year 15 (2041)	Operation year 60 (2086)
		Winter	Night time	Winter	Summer	Night time	summer	summer
HEX.3.001	View south-west from public right of way - IVE/13/1	Minor adverse	No further assessment required	Negligible	Negligible	No further assessment required	Negligible	Negligible
HEX.4.002	View west from Iver Railway Station	Minor adverse	No further assessment required	Negligible	Negligible	No further assessment required	Negligible	Negligible
HEX.2.003	View north-west from adjacent to St. Andrews United Reformed Church	Minor adverse	No further assessment required	Negligible	Negligible	Negligible	Negligible	Negligible
HEX.3.004	View from public right of way - IVE/15/1 looking north-west	Moderate adverse	No further assessment required	Moderate adverse	Moderate adverse	No further assessment required	Moderate adverse	Moderate adverse
HEX.2.005	View north from Parlaunt Road, Langley	Minor adverse	No further assessment required	Minor adverse	Minor adverse	Negligible	Negligible	Negligible
HEX.2.006	View north-east from Market Lane	Moderate adverse	No further assessment required	Minor adverse	Minor adverse	Minor adverse	Negligible	Negligible
HEX.2.007	View north from Mead Avenue and Maplin Park	Moderate adverse	No further assessment required	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
HEX.6.008	View north from Langley Business Centre	Negligible	No further assessment required	Minor adverse	Minor adverse	No further assessment required	Minor adverse	Minor adverse
HEX.4.009	View east from commercial properties in Langley Business Park	Minor adverse	No further assessment required	Negligible	Negligible	No further assessment required	Negligible	Negligible
HEX.2.010	View south from house boats moored on the Grand Union Canal and the Grand Union Canal Walk (towpath)	Moderate adverse	No further assessment required	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
HEX.7.011	View south from Hollow Hill Lane, adjacent to Iver Golf Club	Minor adverse	No further assessment required	Negligible	Negligible	No further assessment required	Negligible	Negligible
HEX.4.012	View west and south from Hollow Hill Lane	Moderate adverse	No further assessment required	Moderate adverse	Moderate adverse	No further assessment required	Minor adverse	Minor adverse
HEX.2.013	View south from Mansion Lane Caravan Park	Minor adverse	No further assessment required	Negligible	Negligible	Negligible	Negligible	Negligible
HEX.6.014	View west from Thorney Lane Business Park	Negligible	No further assessment required	Minor adverse	Minor adverse	No further assessment required	Minor adverse	Minor adverse
HEX.2.015	View south-west from cottages on Mansion Lane	Minor adverse	No further assessment required	Negligible	Negligible	Negligible	Negligible	Negligible

Part 3 Schedule of not significant effects

7 Temporary effects arising during construction

7.1.1 Due to the scale of the construction activities, works would be highly visible in many locations and would have the potential to give rise to significant effects which cannot be mitigated. This is commonplace with construction of major infrastructure projects, but it should be noted that these effects are temporary in nature and relate to the peak construction phase. Effects during other phases of works are likely to be less due to less construction equipment being required at the time and a reduced intensity of construction activity.

7.2 Landscape assessment

7.2.1 Table 3 summarises the assessment for all the LCAs identified within the study area, which are considered to experience non-significant effects (minor or negligible) during construction of the Proposed Scheme. These are ordered from south to north along the route of the scheme. The assessment of significant effects is presented in Volume 2.

Table 3 : Schedule of non-significant landscape effects during construction

Landscape character area	Description of effect
Stoke and Langley Park Lowland Fringe LCA	Construction activity is located adjacent to, but outside of this LCA. Therefore, there will be no direct impact on landscape components within the LCA or the existing vegetation along the Grand Union Canal, which defines the southern boundary of the LCA. Overall, the magnitude of change is considered to be low as the works are adjacent to existing light industrial development and the existing landscape structure will be unaffected. Assessed alongside the high sensitivity of the character area, this would result in a minor adverse effect.
Slough Urban LCA	The construction works will result in the loss of brownfield land and the introduction of construction plant and new temporary structures in a generally flat, partially enclosed part of the LCA. The remainder of the LCA to the south and west of this area will not be noticeably affected beyond those properties located adjacent to the proposed HEx Depot. Therefore the magnitude of change is considered to be medium. Assessed alongside the low sensitivity of the character area, this would result in a minor adverse effect.

7.3 Visual assessment

7.3.1 Table 4 summarises the assessment for all the representative viewpoints identified within the study area, which are considered to experience non-significant effects (minor or negligible) during construction of the Proposed Scheme. These are ordered from south to north along the route of the Proposed Scheme. The assessment of significant effects is presented in Volume 2. The construction assessment has been undertaken during winter, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, would be in leaf.

Table 4 : Schedule of non-significant visual effects during construction

Viewpoint	Description of effect
HEx.3.001: View south-west from public right of way -IVE/13/1	As result of distance between the receptors and the work and the presence of intervening buildings and vegetation, views for pedestrians on the PRoW of the construction works would be largely filtered or in the background of the view. Cranes would however, be visible in the background above intervening buildings and vegetation. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.
HEx.4.002: View west from Iver Railway Station	Intervening buildings and vegetation would screen the views from pedestrians looking west along the railway line towards the construction works. Cranes would be visible in the background above intervening buildings and vegetation. The low magnitude of change assessed against the medium sensitivity of the receptor would result in a minor adverse effect.
HEx.2.003: View north-west from adjacent to St. Andrews United Reformed Church	Intervening buildings and vegetation would screen the views from residents and vehicles looking north-west towards the construction works. Cranes would be visible in the background above intervening buildings and vegetation. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.
HEx.2.005: View north from Parlaunt Road, Langley	The views from residents looking north across neighbouring fields. The majority of the construction site would be screened by existing vegetation. Cranes would be visible in the background above intervening buildings. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.

Viewpoint	Description of effect
HEX.6.008: View north from Langley Business Centre	<p>The construction site would be screened by existing buildings and vegetation, both in the foreground and middle ground of the view. Cranes would be visible in the background above intervening buildings.</p> <p>The low magnitude of change assessed against the low sensitivity of the receptor would result in a negligible effect.</p>
HEX.4.009: View east from commercial properties on Langley Business Park	<p>The majority of the construction site would be screened by existing buildings in the middle ground of the view. Views may be possible for users adjacent to the site. Cranes would be visible in the background above intervening buildings.</p> <p>The medium magnitude of change assessed against the low sensitivity of the receptor would result in a minor adverse effect..</p>
HEX.7.011: View south from Hollow Hill Lane, adjacent to Iver Golf Club	<p>The construction site would be screened by intervening buildings and vegetation, both in the foreground and middle ground of the view. Cranes would be visible in the background above intervening buildings.</p> <p>The low magnitude of change assessed against the medium sensitivity of the receptor would result in a minor adverse effect.</p>
HEX.2.013: View south from Mansion Lane Caravan Park	<p>The views of the construction site for residents would be largely screened by intervening vegetation, and fencing. Cranes would be visible in the background of the view above intervening vegetation.</p> <p>The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.</p>
HEX.6.014: View west from Thorney Lane Business Park	<p>As result of distance and intervening buildings and vegetation, views of the construction works would be too distant to be significant or would be screened. Cranes would be visible in the background above intervening buildings and vegetation.</p> <p>The low magnitude of change assessed against the low sensitivity of the receptor would result in a negligible effect.</p>

8 Permanent effects arising during operation

8.1 Landscape assessment

8.1.1 Table 5 summarises the assessment for all the LCAs identified within the study area, which are considered to experience non-significant effects (minor or negligible) during the operation of the Proposed Scheme. These are ordered from south to north along the route of the Proposed Scheme. The year 15 and year 60 assessments take into account the further integration of the Proposed Scheme into the landscape following greater maturity of the proposed planting. The assessment of significant effects is presented in Volume 2.

Table 5 : Schedule of non-significant landscape effects during operation

Landscape character area	Description of effect - operation year 1 (2026)	Description of effect - operation year 15 (2041)	Description of effect - operation year 60 (2086)
Stoke and Langley Park Lowland Fringe LCA	There will be no direct impact on landscape components within the LCA or the existing vegetation along the Grand Union Canal, which defines the southern boundary of the LCA. Overall, the magnitude of change is considered to be low as the new structures are adjacent to existing light industrial development and the existing landscape structure will be unaffected. Assessed alongside the high sensitivity of the character area, this would result in a minor adverse effect.	No further reduction of effects. Therefore resulting in a minor adverse effect.	No further reduction of effects. Therefore resulting in a minor adverse effect.
Slough Urban LCA	There would be changes to a small part of the character area, including the introduction new elements into the LCA, including the maintenance shed, offices and storage, associated lighting and overhead line equipment. However, the new elements would be characteristic of the existing setting resulting in a medium magnitude change assessed alongside a low sensitivity would result in a minor adverse effect.	No further reduction of effects. Therefore resulting in a minor adverse effect.	No further reduction of effects. Therefore resulting in a minor adverse effect.

8.2 Visual assessment

8.2.1 Table 6 summarises the assessment for all the representative viewpoints identified within the study area, which are considered to experience non-significant effects (minor or negligible) during operation of the Proposed Scheme. These are ordered from south to north along the route of the Proposed Scheme. The year 15 and year 60 assessments take into account how greater maturity of proposed planting may further screen views of the Proposed Scheme. The assessment of significant effects is presented in Volume 2.

Table 6 : Schedule of non-significant visual effects during operation

Viewpoint	Description of effect – operation year 1 (2026)		Description of effect – operation year 15 (2041) summer	Description of effect – operation year 60 (2086) summer
	Winter	Summer		
HEx.3.001: View south-west from Public Right of Way -IVE/13/1	As result of distance and intervening buildings and vegetation, the views for pedestrians on the PRoW during operation of the Proposed Scheme would be largely screened. The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	No further assessment required	No further assessment required
HEx.4.002: View west from Iver Railway Station	As result of distance, intervening buildings and vegetation, views of the Proposed Scheme during operation would be largely screened. The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	No further assessment required	No further assessment required
HEx.2.003: View north-west from adjacent to St. Andrews United Reformed Church	As result of distance and intervening vegetation, views of the Proposed Scheme during operation would be screened.	The intervening vegetation will further screen the Proposed Scheme. Negligible effect	No further assessment required	No further assessment required

Viewpoint	Description of effect – operation year 1 (2026)		Description of effect – operation year 15 (2041) summer	Description of effect – operation year 60 (2086) summer
	Winter	Summer		
	The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.			
HEx.2.005: View north from Parlaut Road, Langley	As result of distance and intervening buildings and vegetation, views of the Proposed Scheme during operation would be largely screened. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	The maturation of proposed mitigation planting means that effects would result in a magnitude of change of negligible in year 15 of operation and would result in negligible effects.	The proposed mitigation planting means that effects would remain unchanged in year 60 of operation. The magnitude of change remains negligible and would result in negligible effects.
HEx.2.006: View north-east from Market Lane	As result of intervening infrastructure and vegetation, views of the Proposed Scheme during operation would be largely screened. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	The maturation of proposed mitigation planting means that effects would result in a magnitude of change of negligible in year 15 of operation and would result in negligible effects.	The proposed mitigation planting means that effects would remain unchanged in year 60 of operation. The magnitude of change remains negligible and would result in negligible effects.
HEx.6.008: View north from Langley Business Centre	Glimpsed views of the Proposed Scheme during operation would be possible. However, this will be in the context of adjacent existing light industry and the GWML. The low magnitude of change assessed against the medium sensitivity of the receptor would result in a minor adverse effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	Due to the distance of the receptor from the operation works, effects would remain unchanged in year 15 of operation. The magnitude of change remains low and would result in minor adverse effects.	Due to the distance of the receptor from the operation works, effects would remain unchanged in year 60 of operation. The magnitude of change remains low and would result in minor adverse effects.
HEx.4.009: View east from commercial properties on Langley Business Park	As result of intervening buildings and vegetation, views of the Proposed Scheme during operation would be largely screened. The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.		No further assessment required	No further assessment required
HEx.2.010: View south from house boats moored on the Grand Union Canal and the Grand Union Canal Walk (towpath)	Glimpsed views of the Proposed Scheme during operation would be possible through adjacent vegetation. However, these will only be partial; with the majority of the views of operation screened. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	Due to the distance of the receptor from the operation works, effects would remain unchanged in year 15 of operation. The magnitude of change remains low and would result in minor adverse effects.	Due to the distance of the receptor from the operation works, effects would remain unchanged in year 60 of operation. The magnitude of change remains low and would result in minor adverse effects.
HEx.7.011: View south from Hollow Hill Lane, adjacent to Iver Golf Club	As result of distance and intervening buildings and vegetation, views of the Proposed Scheme during operation by users of the golf course would be screened. The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	No further assessment required	No further assessment required
HEx.4.012: View west and south from Hollow Hill Lane	Significant Year 1	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	The maturation of proposed mitigation planting means that effects would result in a magnitude of change of low in year 15 of operation and would result in minor adverse effects.	The maturation of proposed mitigation planting means that effects would result in a magnitude of change of low in year 60 of operation and would result in minor adverse effects.

Viewpoint	Description of effect – operation year 1 (2026)		Description of effect – operation year 15 (2041) summer	Description of effect – operation year 60 (2086) summer
	Winter	Summer		
HEx.2.013: View south from Mansion Lane Caravan Park	As result of intervening vegetation, views for residents of the Proposed Scheme during operation would be screened. The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	No further assessment required	No further assessment required
HEx.6.014: View west from Thorney Lane Business Park	As result of distance and intervening vegetation, views of the Proposed Scheme during operation would be largely screened. The low magnitude of change assessed against the high sensitivity of the receptor would result in a minor adverse effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	Due to the distance of the receptor from the operation works, effects would remain unchanged in year 15 of operation. The magnitude of change remains low and would result in minor adverse effects.	Due to the distance of the receptor from the operation works, effects would remain unchanged in year 60 of operation. The magnitude of change remains low and would result in minor adverse effects.
HEx.2.015: View south-west from cottages on Mansion Lane	As result of distance and intervening buildings and vegetation, views for pedestrians on the PRow of the Proposed Scheme during operation would be screened. The negligible magnitude of change assessed against the high sensitivity of the receptor would result in a negligible effect.	The intervening vegetation will further screen the Proposed Scheme, resulting in a negligible effect	No further assessment required	No further assessment required

SES and AP2 ES Appendix HEX-SV-001

Environmental topic:	Sound and Vibration	SV
Appendix name:	Data appendix	001
Community forum area:	Heathrow Express Depot, Langley	HEX

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List of tables

Table 1 SES and AP2 ES Appendix HEX-SV-001: Assessment of construction noise at residential receptors

Table 2: Assessment of construction noise at non-residential receptors

1 Introduction

1.1.1 This appendix provides a construction sound noise and vibration assessment report for the proposed Heathrow Express Depot (HEX), Langley.

1.1.2 This report should be read in conjunction with the SES and AP2 ES Volume 4.

2 Scope, assumptions and limitations

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

2.1.2 Additional local assumptions and limitations are set out in the SES and AP2 ES Volume 4.

2.2 Changes of relevance to this assessment

2.2.1 The proposed HEX, Langley amendment has the potential to lead to new significant noise effects. An assessment of these effects is presented below.

3 Effects arising during construction

3.1 Avoidance and mitigation measures

3.1.1 The avoidance and mitigation measures are set out in Volume 4.

3.1.2 In addition to this mitigation, taller screening as described in the draft code of construction practice (CoCP) has been assumed along the edge of the proposed HEX Depot construction site boundary adjacent to the residential communities.

3.2 Quantitative identification of impacts and effects

Ground-borne sound and vibration

3.2.1 No impacts have been predicted as the result of construction ground-borne sound and vibration in this area.

Airborne sound: direct impacts and effects

3.2.2 The assessment results, impact criteria and significance criteria for the assessment of the amendment at residential and non-residential receptors are presented in Table 1 and Table 2 respectively. These tables present only those assessment locations for which the assessment has changed compared with the main ES. Explanation of the information in Table 1 and Table 2 is provided in the main ES Volume 5: Appendix SV-001-000 with the following additional notes:

SES and AP2 ES Appendix HEX-SV-001

Where the significant effect column is highlighted in pink, then a significant effect is identified at the referenced community, or individual non-residential receptor.

- * Significant effect – the quantitative impact methodology has identified either:
 - 1) no impact at this receptor but further information (see assessment) has identified that a significant effect is nonetheless likely; or
 - 2) an impact at this receptor which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect.
- ~ The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in the main ES Volume 5: Appendix SV-001-000).
- A Type of effect – adverse effect.
- S Type of effect – significant adverse effect.
- NA Type of effect – not generally an adverse effect.
- B Type of effect – for non-residential receptors further detail about the type of effect is set out in the text of the main ES Appendix SV-001-000.
- R Type of receptor – residential.
- G Type of receptor:
 - (G1) theatres, large auditoria and concert halls;
 - (G2) sound recording and broadcast studios;
 - (G3) places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls;
 - (G4) schools, colleges, hospitals, hotels and libraries; or
 - (G5) offices and general commercial premises.
- T Receptor design – typical.
- S Receptor design – special.
- H Existing environment – high existing ambient noise levels: daytime level more than 75dB, evening-time level more than 65dB or night-time level more than 55dB L_{pAeq} at the façade.
- NI Mitigation effect - identified as likely to qualify for noise insulation under the draft Construction Code of Practice (draft CoCP).
- D,E,N Impact duration (months) – duration of impact during the day (D), evening (E) or night (N).

Table 3: Assessment of construction noise at residential receptors

Assessment location		Impact criteria			Significance criteria									Significant effect	
ID	Area represented	Typical/highest monthly outdoor LpAeq [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]		Mitigation effect
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
901165	Bathurst Walk, Iver	59/67 [>C]	47/49 [>C]	47/49 [>C]	Day: haul road movements, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	NA	9	R	T	H	-	-	-	-	
901166	Bathurst Walk, Iver	54/63 [A]	52/54 [C]	52/54 [>C]	Day: haul road movements, Evening: demolition and site preparation associated with Langley depot construction, Night: demolition and site preparation associated with Langley depot construction	NA	10	R	T	H	-	-	-	-	
901167	Southwold Spur, Langley	57/66 [B]	56/61 [C]	56/61 [>C]	Day: demolition and site preparation associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	S	24	R	T	H	-	-	N 6	NI	CSV27-Co1
901168	Mead Avenue, Langley	61/68 [B]	55/63 [C]	55/63 [>C]	Day: demolition and site preparation associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley	S	23	R	T	H	-	-	N 4	NI	CSV27-Co1

Assessment location		Impact criteria			Significance criteria									Significant effect	
ID	Area represented	Typical/highest monthly outdoor LpAeq [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]		Mitigation effect
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
					depot construction										
901169	Mead Avenue, Langley	51/62 [A]	53/59 [B]	53/59 [C]	Day: earthworks associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	S	23	R	T	-	-	-	N 4	NI	CSV27-Co1
901170	Station Road, Langley	53/65 [B]	47/52 [C]	47/52 [>C]	Day: demolition and site preparation works associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	NA	5	R	T	H	-	-	-	-	
901172	Maplin Park, Langley	51/61 [A]	53/57 [B]	53/57 [C]	Day: earthworks associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	S	67	R	T	-	-	-	N 4	NI	CSV27-Co1

Assessment location		Impact criteria			Significance criteria								Significant effect		
ID	Area represented	Typical/highest monthly outdoor LpAeq [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Impact duration [months]	Mitigation effect
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
901174	Mansion Lane Caravan Site	53/61 [A]	57/59 [B]	57/59 [C]	Day: demolition and site preparation works associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	S	15	R	T	-	-	-	N 9	NI	CSV27-Co2
901175	Mansion Lane Caravan Site	51/60 [A]	49/55 [B]	49/55 [C]	Day: earthworks associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	S	15	R	T	-	-	-	-	NI	
901176	Dudley Wharf Caravan Site, Hollow Hill Lane	52/61 [A]	53/57 [B]	53/57 [C]	Day: earthworks associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	S	10	R	T	-	-	-	N 6	NI	CSV27-Co2
901178	Bathurst Walk, Iver	52/60 [A]	53/54 [C]	53/54 [C]	Day: demolition and site preparation works associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	NA	15	R	T	H	-	-	-	-	

Assessment location		Impact criteria			Significance criteria								Significant effect		
ID	Area represented	Typical/highest monthly outdoor LpAeq [dB] at the facade [Assessment category A/B/C]			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Impact duration [months]	Mitigation effect
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
901179	Syke lngs, lver	43/54 [A]	48/50 [B]	48/50 [C]	Day: demolition and site preparation works associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	NA	25	R	T	-	-	-	-	-	
901180	Alderbury Road, Langley	48/57 [A]	46/50 [B]	46/50 [C]	Day: demolition and site preparation works associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	NA	10	R	T	-	-	-	-	-	
901181	Canal boats, GUC, Langley	51/59 [A]	44/49 [B]	44/49 [C]	Day: demolition and site preparation works associated with Langley depot construction, Evening: earthworks associated with Langley depot construction, Night: earthworks associated with Langley depot construction	NA	5	R	T	-	-	-	-	-	

Table 4: Assessment of construction noise at non-residential receptors

Assessment location		Impact criteria			Significance criteria									Significant effect	
ID	Area represented	Typical/highest monthly outdoor LpAeq [dB] at the façade			Construction activity resulting in highest forecast noise levels	Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Impact duration [months]		Mitigation effect
		Day 0700-1900	Evening 1900-2300	Night 2300-0700											
901171	Langley business Centre	56/68	-	-	Day: Demolition and Site Preparation associated with Langley Depot Construction	B	1	G5	T	H	-	-	-	-	

Airborne sound: indirect effects

- 3.2.4 Construction road traffic associated with the construction phases of the HS2 scheme will generate airborne noise. The change in traffic noise level at a reference distance of 10m from the edge of the nearside carriageway resulting from the presence of construction traffic for a given road has been predicted, based upon traffic information for the HS2 scheme. The results for the roads where additional potentially significant effects could arise as a result of the proposed HEx depot are presented in Table 3.
- 3.2.5 Explanation of the information within Table 3 is provided in the Main ES Volume 5:Appendix SV-001-000, with the following additional notes:



Where the significant effect column is highlighted in dark red, then a significant effect is identified on nearby communities or individual receptors.

Change values



Yellow denotes a minor impact – a change is of 3-5 dB or 1-3dB where a high existing sound level is identified.



Orange denotes a moderate impact – a change is of 5-10 dB or 3-5dB where a high existing sound level is identified.



Red denotes a major impact – a change is of >10 dB or >5dB where a high existing sound level is identified.

Table 5: Assessment of construction traffic noise levels

Road name	Future baseline sound level (dB)	Future baseline sound level + construction traffic (dB)	Change (dB)	Significant effect
	Daytime L _{pAeq,16hr} 0700-23:00 free-field	Daytime L _{pAeq,16hr} 0700-2300 free-field		
Bangors Road, South	67.4	68.7	+1.3	CSV27-C03

3.3 Assessment of significance of effects

Residential receptors: direct effects- individual dwellings

3.3.1 Taking account of the avoidance and mitigation measures, approximately 60 residential buildings 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.

3.3.2 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

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

3.3.4 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.

3.3.5 Table 4 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 4 are considered to be significant.

Table 6: 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-Co1	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 Langley Depot Construction earthworks. Typical and highest monthly noise levels of 55 and 60dB to 65dB	Between four and six months
CSV27-Co2	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 Langley Depot Construction earthworks. Typical and highest monthly noise levels of 55 and 60dB	Between six and nine months

Residential receptors: indirect effects

- 3.3.6 Construction traffic is likely to cause adverse noise effects on residential receptors along Bangors Road, South (CSV27-Co3). 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.
- 3.3.7 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

- 3.3.8 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

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

Cumulative effects from the HS2 scheme and other committed development

- 3.3.10 This assessment has considered the potential cumulative construction noise effects of the HS2 scheme and other committed developments. In this area, no committed developments are due to be built at the same time as the HS2 scheme and accordingly, construction noise or vibration from the HS2 scheme is unlikely to result in any significant cumulative noise effects.

SES and AP2 ES Appendix HEX-SV-002

Environmental topic:	Sound, noise and vibration	SV
Appendix name:	Baseline sound, noise and vibration report	002
Community forum area:	Proposed HEx Depot, Langley	HEX

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1 Introduction

1.1.1 This appendix includes details of the existing and future baseline sound environment within the area surrounding the proposed Heathrow Express (HEX) depot, Langley. It provides details of measurements and any other data collection which has been undertaken in order to obtain existing and future baseline sound levels.

1.1.2 This report should be read in conjunction with the SES and AP2 ES Volume 4.

1.1.3 Surrounding the proposed HEX depot site, a number of additional baseline sound measurements have been undertaken.

1.2 Existing acoustic environment

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

1.2.2 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 sounds from local road traffic on surrounding roads and intermittent sounds from aircraft. Railway sound levels are lower at properties further from the railway and road traffic is more noticeable.

1.2.3 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 railway. Train horns are audible at locations in close proximity to the railway line.

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

2 Scope, assumptions and limitations

2.1 Changes of relevance to this assessment

2.1.1 The assessment of construction and operational sound, noise and vibration for the proposed HEX depot, Langley involves assessment in a new geographical area to those previously assessed in the Main ES. This appendix includes details of the existing and future baseline sound environment within the area.

2.1.2 Maps showing the baseline sound monitoring locations and assessment locations within this area are included in Map Series SV-03 and SV-04 (SES and AP2 ES Volume 5, Off Route Effects Map book).

3 Environmental Baseline

3.1 Existing baseline data collection methodology

3.1.1 The overall approach to baseline data collection for sound noise and vibration is described in Volume 5: Appendix SV-001-000 from the main ES.

3.1.2 Surrounding the proposed HEx depot site, baseline sound measurements have been undertaken at seven new locations including four long term measurements and three short term measurements. These were undertaken at locations judged to be representative of sensitive residential properties on Bathurst Walk, Mead Avenue, Maplin Park, Southwold Spur, Alderbury Road, canal boats on the GUC and the caravan site located on Mansion Lane.

3.2 Existing baseline sound levels

3.2.1 From the measurements described in Section 3.1, baseline sound levels have been ascertained for each new assessment location within this area. These levels are presented in terms of the following key sound indicators:

- for the operational sound assessment:
 - $L_{pAeq,16hr\ weekday}$ daytime (07:00-23:00) sound pressure level;
 - $L_{pAeq,8hr\ weekday}$ night-time (23:00-07:00) sound pressure level;
 - arithmetic average of $L_{pAFmax,5min}$ night-time sound pressure level; and
 - highest $L_{pAFmax,5min}$ night-time sound pressure level; and
- for the construction sound assessment:
 - daytime L_{pAeq} sound pressure level (Monday to Friday 07:00-19:00; Saturday 07:00-13:00);
 - evening/weekend L_{pAeq} sound pressure level (Monday to Friday 19:00-23:00; Saturday 13:00- 23:00; Sunday 07:00 to 23:00); and
 - night-time L_{pAeq} sound pressure level (Monday to Sunday 23:00-07:00).

3.2.2 These values are presented in Table 1. The data source coding included within this table details how the baseline sound levels allocated to each assessment location have been derived. This coding is summarised in Table 2 and explained in detail in Volume 5: Appendix SV-001-000 from the main ES.

Table 1: Existing baseline sound levels

Assessment location ID	Area represented	Measurement location	Existing baseline sound level (dB)							Data source coding[1]
			For operational sound assessment				For construction sound assessment			
			Daytime LpAeq,16hr	Night-time LpAeq,8hr	Arithmetic average of night-time LpAFmax,5min	Highest night-time LpAFmax,5min	Daytime LpAeq	Evening/weekend LpAeq	Night-time LpAeq	
901165	Bathurst Walk, Iver	LM7082	72.7	68.5	80.5	94.9	73.2	68.2	67.2	1,A,i,a
901166	Bathurst Walk, Iver	LM7083	58.1	56.4	60.9	71.4	58.5	60.9	56.5	1,A,i,a
901167	Southwold Spur, Langley	LM7081	62.7	58.0	60.2	74.6	63.5	59.9	57.5	1,BC,ii,b
901168	Mead Avenue, Langley	LM7080	62.3	57.2	65.9	87.0	62.7	57.9	55.7	1,A,ii,b
901169	Maed Avenue, Langley	LM7086	56.4	50.8	57.4	71.8	57.2	53.6	50.3	2,A,ii,b
901170	Station Road, Langley	LM7080	62.3	57.2	65.9	87.0	62.7	57.9	55.7	1,A,i,a
901171	Langley business Centre	LM7080	62.3	57.2	65.9	87.0	62.7	57.9	55.7	1,A,ii,b
901172	Maplin Park, Langley	LM7086	56.4	50.8	57.4	71.8	57.2	53.6	50.3	2,A,ii,b
901173	Langley Connect	LM7080	62.3	57.2	65.9	87.0	62.7	57.9	55.7	1,A,ii,b
901174	Mansion Lane Caravan Site	LM7084	58.3	51.1	60.1	64.9	58.9	56.0	51.1	4,A,ii,b
901175	Mansion Lane Caravan Site	LM7084	58.3	51.1	60.1	64.9	58.9	56.0	51.1	4,A,ii,b
901176	Dudley Wharf Caravan Site, Hollow Hill Lane	LM7084	58.3	51.1	60.1	64.9	58.9	56.0	51.1	4,A,ii,b

Assessment location ID	Area represented	Measurement location	Existing baseline sound level (dB)							Data source coding[1]
			For operational sound assessment				For construction sound assessment			
			Daytime LpAeq,16hr	Night-time LpAeq,8hr	Arithmetic average of night-time LpAFmax,5min	Highest night-time LpAFmax,5min	Daytime LpAeq	Evening/weekend LpAeq	Night-time LpAeq	
901177	Works, Iver	LM7082	68.0	63.8	80.5	94.9	68.5	63.5	62.5	1,C,ii,b
901178	Bathurst Walk, Iver	LM7083	58.1	56.4	60.9	71.4	58.5	60.9	56.5	1,A,ii,b
901179	Syke Ings, Iver	LM7083	52.4	50.7	60.9	71.4	52.8	55.2	50.8	1,C,ii,b
901180	Alderbury Road, Langley	LM7080	57.3	52.2	65.9	87.0	57.7	52.9	50.7	1,B,ii,b
901181	Canal Boats, GUC, Langley	LM7085	56.8	51.7	67.6	71.3	57.3	54.9	51.7	4,A,i,a

Table 1: Data source coding key

Code	Data source type
1	Long-term measurement location
2	Short-term (linked to simultaneous long-term)
3	Short-term (using profile from non-simultaneous long-term)
4	Short-term using standard (National Noise Incidence Study ¹ or other) 24hour profile
5	Specific validated prediction
6	Predictions from other sources (Defra noise maps ² , etc.).
7	Generic levels

Code	Corrections applied
A	Data from above source applied directly
B	Correction applied for screening
C	Correction applied for distance from source
D	Minimum level cut-off applied.

Code	Distance from measurement
i	Data applied from a measurement at or very close to the assessment location.
ii	Data applied from a local measurement location at a greater distance but noted to have equivalent acoustic climate.
iii	Data applied from a distant measurement location where sound levels would be expected to be similar.

Code	Uncertainty
a	Data are considered highly representative of the prevailing sound climate
b	Data are considered representative of the prevailing sound climate, but variations in measured levels indicate that there may be a higher degree of uncertainty than for (a).
c	Data are considered to be an estimate of the sound climate, (e.g. taken from Defra noise maps, etc.).

3.3 Future baseline methodology

Construction

- 3.3.1 The assessment of noise from construction activities assumes a baseline year of 2017. As a conservative assumption, it has been assumed that no change in baseline sound levels will occur between the existing baseline (2015) and the future baseline year of 2017.
- 3.3.2 Due to the duration of the construction work and as the precise timing of the highest sound levels would be different in each location, using baseline sound levels for 2017 as the start of the construction period, provides a reasonable worst case assessment.

¹ Building Research Establishment, (2002), *National Noise Incidence Study 2000/2001*.

² Defra, Noise Mapping England, <http://services.defra.gov.uk/wps/portal/noise/>; accessed 26 July 2013.

- 3.3.3 The assessment of construction traffic is based on future baseline traffic flows for 2021, as a year which is representative of the middle of the construction period.

Operation

- 3.3.4 There is potential for future baseline sound levels for operation (2026) to change when compared to the existing baseline sound levels (2015) as a result of changes in baseline sound sources.
- 3.3.5 In the vast majority of cases where change might occur it is expected that baseline sound levels will increase at assessment locations due to increases in vehicle movements on roads. It is therefore considered that the use of the 2012 baseline levels in the operational assessment will result in a worst case assessment of the impact of changes in the future baseline sound levels in the majority of locations.
- 3.3.6 Therefore for the purposes of this assessment future baseline levels have been assumed to be identical to those identified in Table 1 of this appendix for 2015.
- 3.3.7 In addition, based on available road traffic information a screening exercise has been undertaken to identify any areas in which a reduction in baseline sound level might be likely. Where reductions in baseline sound level have been identified a further screening assessment has been completed to identify if these changes would be likely to materially affect the operational sound assessment.
- 3.3.8 The screening assessment has not identified any locations in this area where a decrease in future baseline (2026), compared to existing baseline (2015), is likely to materially affect the operational sound assessment.

4 References

British Standards Institute (BSi), (1997), BS4142 Method for rating industrial noise affecting mixed residential and industrial areas, BSi.

Building Research Establishment, (2002), National Noise Incidence Study, 2000/2001.

Defra, Noise Mapping England, <http://services.defra.gov.uk/wps/portal/noise/>;
Accessed: 26 July 2013.

SES and AP2 ES Appendix HEX-SV-003

Environmental topic:	Sound, noise and vibration	SV
Appendix name:	Operational assessment report	003
Community forum area:	Off-route effects	HEX

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1 Introduction

- 1.1.1 This appendix provides technical details of the operational sound, noise and vibration assessment for the proposed Heathrow Express Depot (HEX), Langley. This update should be read in conjunction with Appendix SV-001-000 from the main ES.

2 Scope, assumptions and limitations

2.1 Changes of relevance to this assessment

- 2.1.1 Operational sound, noise and vibration assessments have been undertaken for the proposed HEX depot trains at Langley.

2.2 Assumptions

- 2.2.1 Route-wide assumptions are outlined in Main ES Volume 1, Section 8, and are further detailed in Main ES Volume 5: Appendix SV-001-000. Local assumptions that apply to the assessment of operational sound noise and vibration within this area are set out in the following clauses.

HEX trains source term assumptions

- 2.2.2 At the speeds which the train will operate on the sidings and approach lines, the pass-by sound level is dominated by the rolling noise and the starting noise, and therefore rather than the multi-source noise model used for the HS2 main lines, a more simple two source model has been used to assess noise from the HEX trains.
- 2.2.3 The rolling sound has been assessed at a height of 0.0m above rail head, which includes sound emitted by the wheels and the track, and the starting sound has been assessed, at a height of 2m above rail head, which includes sound generated by power, traction and auxiliary systems.
- 2.2.4 The SEL relationships for these two sources are:
- $R_{SEL} + 20\log_{10}V$ for rolling sound; and
 - $S_{SEL} - 10\log_{10}V$ for starting sound
- where R_{SEL} and S_{SEL} are constants and V is the train speed.
- 2.2.5 The corresponding relationships for $L_{pAF,max}$ are:
- $R_{LpAF,max} + 30\log_{10}V$ for rolling sound; and
 - $S_{LpAF,max}$ for starting sound.
- 2.2.6 $L_{pAeq,tp}$ exhibits the same speed dependencies as $L_{pAF,max}$.
- 2.2.7 The source term for the HEX trains has been taken from measurements of similar rolling stock. The source term is an $L_{pAF,max}$ of 65dB at 25m, the SEL is 76dB at 25m and $L_{Aeq,Tp}$ is 57dB at 25m.

- 2.2.8 For curves with a radius of less than 300m a correction to allow for curving noise has been added to the rolling noise component. The correction from the German Schall 03 (1990 edition) standard has been applied. This correction has been validated from measurements obtained by Transport for London for the London Overground project.

Depot movement assumptions

- 2.2.9 The assessment has been undertaken based upon the information provided in Volume 4. Specifically for the acoustic modelling the following has been assumed:
- all 16 stabling berths will be full at night and two are full in the day with all auxiliary converters operating constantly;
 - stationary trains have heating, ventilation and air conditioning (HVAC) units switched off when stabled;
 - train movements in/out/around the depot are no more than 5 per hour (based on GRIP3 report)¹;
 - carriage wash:
 - every train will be washed as they either enter or leave service, it is assumed that the train wash will be operated up to five times per hour;
 - it takes 3.5 minutes to wash a train;
 - carriage wash is in a building but has open apertures on each end; and,
 - carriage wash buildings are constructed using a cladding with a liner panel providing an in-situ sound insulation performance of approximately 38dB.
 - maintenance building:
 - three doors are left open all the times² ;
 - maintenance building is constructed using a cladding with a liner panel providing an in-situ sound insulation performance of approximately 38dB.

¹ HS2D1A-EMG-REP-ARB-00010 Heathrow Express: Old Oak Common Depot Relocation Langley Depot – Final Option Selection Report, Issue 4, 27 February 2015

² Where practicable these doors should remain closed, but in practicality and to ensure our assessment is a reasonably foreseeable worst-case we have assumed that they are open.

3 Effects arising during operation

3.1 Avoidance and mitigation measures

3.1.1 These are set out in main ES, Volume 4, Section 6.

3.2 Quantitative identification of impacts and effects

Ground-borne sound and vibration

3.2.1 The amendment do not result in any new alter or amended railway within the groundborne noise and vibration scoping distance identified in the main ES Appendix SV-001-000. Therefore no assessment of groundborne noise and vibration is included.

Airborne sound: direct impacts and effects

3.2.2 The direct effects from the operation of the proposed HEx Depot including altered roads and railway lines are presented in Table 1 for the assessment locations identified on AP2 ES, Volume 4, map series Sv-02. The assessment information, impact criteria and significance criteria for the assessment of the incorporated mitigation case at residential and non-residential receptors are presented in Table 1.

3.2.3 Explanation of the Table 1 information is provided in Main ES, Volume 5: Appendix SV001-000.

3.2.4 The direct effects from the operation of the proposed HEx Depot as well as any new, amended or altered roads or railway lines, which are identified as part of the scheme, are presented in Table 1 for the assessment locations identified in map series Sv-02 in the AP2 ES Volume 4 map book.

3.2.5 The assessment information, impact criteria and significance criteria for the assessment of the incorporated mitigation case at residential and non-residential receptors are presented in Table 1. The results should be considered in conjunction with the information contained in map series Sv-02 in the AP2 ES Volume 4 map book.

3.2.6 Explanation of the Table 1 information is provided in Volume 5: Appendix SV001-000, with the following additional notes.

SES and AP2 ES Appendix HEX-SV-003

	Where the significant effect column is marked, then a significant effect is identified at the referenced group of dwellings, or individual residential or non-residential receptor.
	Yellow denotes a minor impact at a residential building – a change is of 3-5dB.
	Orange denotes a moderate impact at a residential building – a change is of 5-10dB.
	Red denotes a major impact at a residential building – a change is of >10dB.
* ** ***	Day - $L_{pAeq,07:00-23:00}$ Night - $L_{pAeq,23:00-07:00}$ Max - L_{pAFmax} In the proposed HEx Depot only column, two values are presented. The first is the value for the HS2 mitigated train and the second is the value for the TSI compliant train. For further information refer to Volume 5: Appendix SV-001-000.
****	Where the proposed HEx Depot modifies an existing source, i.e. road or railway realignments, the <i>proposed HEx Depot only</i> level in the table includes the sound from the modified source. In this situation the <i>Do something (Opening year baseline + Year 15 traffic)</i> level has been corrected so as to not double count the sound associated with the road or railway on its new and existing alignment.
A	Adverse effect.
B	For non-residential receptors further detail about the type of effect is set out in the text of Appendix SV-001-000.
CD	Committed Development. The value in brackets in the number of impacts represented column is the value with the committed development.
G	(G1)Theatres, large auditoria and concert halls, (G2) Sound recording and broadcast studios, (G3) Places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (G4) Schools, colleges, hospitals, hotels and libraries, and (G5) Offices and general commercial premises.
H	High existing ambient sound level. Defined as $>65dB_{Leq, day}$ and/or $>55dB_{Leq, night}$.
L	Low existing ambient sound level. Defined as $<42dB_{Leq, day}$ and/or $<32dB_{Leq, night}$.
LD	Landscape receptor.
NA	Generally no adverse effect.
NI	The receptor is predicted to qualify for mitigation, which shall be provided to the specification defined in the Noise Insulation (Railways and other Guided Rail Systems) Regulations 1996.
R	Residential.
RM	Residential mooring.
S	Significant adverse effect.
U	Unacceptable adverse effect.
#	A change of 3dB or greater has been identified however, the assessment methodology only defines an impact where the absolute sound level from the proposed HEx Depot is greater or equal to 50 dB $L_{pAeq, 23:00-07:00}$ during the daytime or 40 dB $L_{pAeq, 07:00-23:00}$ at night. At the receptor denoted the absolute level condition is not met and therefore no impact is identified.
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000).
\$	A change of 3dB or greater has been identified however, the impact methodology for non-residential receptors includes a screening criteria for G3 building use of 50 dB $L_{pAeq,07:00-23:00}$, for G4 building use 55 dB $L_{pAeq,07:00-23:00}$ and 45 dB $L_{pAeq,23:00-07:00}$, for G5 building use 55 dB $L_{pAeq,07:00-23:00}$. At the receptor denoted the screening criteria is not met and therefore no impact is identified. Further information is provided in Volume 5: Appendix SV-001-000.
^	The impact methodology has either identified an impact at a receptor which based upon further qualitative information does not give rise to a significant effect. Further information is provided at the end of this Appendix.

Table 1: Operational noise – detailed results (AP2 ES amended)

Impact criteria												Significance criteria							Significant effect	
Assessment Location ID	Area represented	HS2 Only			Do minimum (Opening year)			Do something (Opening year +15)		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation of effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
901165	Bathurst Walk, Iver	16	18	<60	73	69	81	73	69	0	0	NA	25	R	T	-	-	-	-	
901166	Bathurst Walk, Iver	14	16	<60	58	56	61	58	56	0	0	NA	150	R	T	-	-	-	-	
901167	Southwold Spur, Langley	38	39	<60	63	58	60	63	58	0	0	NA	160	R	T	-	-	-	-	
901168	Mead Avenue, Langley	30	31	<60	62	57	66	62	57	0	0	NA	25	R	T	-	-	-	-	
901169	Mead Avenue, Langley	30	31	<60	56	51	57	56	51	0	0	NA	103	R	T	-	-	-	-	
901170	Alderbury Road, Langley	21	22	<60	62	57	66	62	57	0	0	NA	5	R	T	-	-	-	-	
901172	Maplin Park, Langley	33	34	<60	56	51	57	56	51	0	0	NA	107	R	T	-	-	-	-	
901174	Grand Union Canal	27	29	<60	58	51	60	58	51	0	0	NA	55	R	T	-	-	-	-	
901175	Mansion Lane Caravan Site	34	35	<60	58	51	60	58	51	0	0	NA	15	R	T	-	-	-	-	
901176	Grand Union Canal	33	33	<60	58	51	60	58	51	0	0	NA	30	R	T	-	-	-	-	
901178	Bathurst Walk, Iver	18	20	<60	58	56	61	58	56	0	0	NA	19	R	T	-	-	-	-	
901179	Skye Ings, Iver	14	16	<60	52	51	61	52	51	0	0	NA	43	R	T	-	-	-	-	
901180	Alderbury Road, Langley	21	21	<60	57	52	66	57	52	0	0	NA	100	R	T	-	-	-	-	
901181	Grand Union Canal	35	35	<60	57	52	66	57	52	0	0	NA	25	R	T	-	-	-	-	
901171	Langley Business Centre	26	27	<60	62	57	66	62	57	0	0	NA	1	G5	T	-	-	-	-	
901173	Canal Wharf Industrial Estate	23	24	<60	62	57	66	62	57	0	0	NA	1	G5	T	-	-	-	-	
901176	The Boatyard, Mansion Lane, Iver	33	33	<60	58	51	60	58	51	0	0	NA	1	G5	T	-	-	-	-	
901177	Thorney Lane Business Park	23	27	<60	68	64	81	57	52	0	0	NA	1	G5	T	-	-	-	-	

Direct impact – Summary

3.2.7 The operational airborne noise impacts identified in Table 1 are summarised in Table 2, including those included in Main ES Appendix 5, SV-004-023 Table 4.

Table 2: Summary of operational airborne sound impacts

Receptor	Number of Impacts		
	Minor	Moderate	Major
Residential properties	0	0	0
Non-residential properties	0	0	0
Quiet Areas	None	None	None

3.3 Assessment of significance of effects

Residential receptors: direct effects- individual dwellings

3.3.1 The mitigation measures will reduce airborne noise, ground-borne noise and groundborne vibration inside all dwellings such that it will not reach a level where it would significantly affect residents.

Residential receptors: direct effects- communities

3.3.2 The avoidance and mitigation measures in this area will avoid ground-borne noise and vibration effects on all residential communities in this area.

Residential receptors: indirect effects

3.3.3 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

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

Non-residential receptors: indirect effects

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

Cumulative effects

3.3.6 Within this area, the operational sound, noise or vibration associated with these developments in conjunction with the operation of the proposed HEx Depot do not result in any significant cumulative effects.

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