E150

High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Technical appendices

CA4: Whitmore Heath to Madeley

Land quality report (LQ-001-004)

July 2017

ES 3.5.2.4.10

E150

High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Technical appendices

CA4: Whitmore Heath to Madeley

Land quality report (LQ-001-004)

July 2017

ES 3.5.2.4.10

Department for Transport

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

High Speed Two (HS2) Limited,
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.gov.uk/hs2

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

ARUP

ERM

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard, please contact High Speed Two (HS2) Limited.

recycle

Printed in Great Britain on paper containing at least 75% recycled fibre.

Contents

List of tables

1 Introduction

1.1.1 The document is an Appendix to the land quality assessment for the Whitmore Heath to Madeley community area (CA4), it comprises:

- a summary of engagement undertaken (Section 2);
- detailed risk assessments (Section 3);
- geological sites of special scientific interest (SSSI) and local geological sites (Section 4); and
- mining and minerals data (Section 5).

1.1.2 Maps referred to throughout this land quality Appendix are contained in the Volume 5 Land Quality Map Book (map references Map LQ-01-113b to LQ-01-115a).

2 Engagement

2.1.1 Table 1 sets out the local authorities and other organisations that have been engaged with during the preparation of the land quality section of the Environmental Statement for the Whitmore Heath to Madeley area, the types of information that have been provided to the assessment team and any specific concerns of those engaged with.

Table 1: Engagement on land quality issues undertaken for the Whitmore Heath to Madeley

Local authority or other organisation	Method/ dates of contact	Information provided and/or specific concerns
Staffordshire County Council (SCC)	Meeting (23 March 2016) Follow up call (05 January 2017)	SCC provided access to their library of ground investigation and contamination surveys. Reports on sites in the vicinity of the Proposed Scheme were reviewed and information within them used in the land quality assessment. Provided information on the then emerging Minerals Local Plan and progress towards its adoption. SCC has been in discussion with HS2 regarding policy guidance on borrow pits. Provision for this has been made in Policy 1.6 of the now adopted Minerals Plan. In order to minimise traffic impact, it was advised that the location of the borrow pits be kept close to the route.
Environment Agenc	Meeting (10 May 2016)	The Environment Agency provided information relating to recorded historical landfill sites within the study area and confirmed there were no SSSI (as defined in Part 2A of the Environmental Protection Act (1990) within the study area. Water abstractions and groundwater resource sensitivity was discussed in relation to the Proposed Scheme.
Food and Environment Research Agency (FERA)	Meeting (16 May 2016)	FERA provided information on the nature and location of foot and mouth disease (FMD) burial and pyre sites relating to the 2001 outbreak within the study area.
British Geological Survey (BGS)	Meeting (23 February 2016)	A meeting held to discuss technical geological issues affecting the Proposed Scheme, including aquifer information (groundwater chemistry and vulnerability) and mineral resources.
Newcastle-under-Lyme Borough Council (NuLBC)	By telephone (27 May 2016 and 22 February 2017)	NuLBC noted no real concerns with respect to land contamination and was not aware of any contaminated land issues in the vicinity of the route. Discussions also covered sand and gravel extraction and historical waste disposal in the Whitmore Heath area.

3 Detailed risk assessment

3.1.1 This section presents assessments for the higher risk potentially contaminated sites 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.

3.1.2 A two stage screening process, stage A and stage B, has been carried out in accordance with the methodology set out in the Scope and Methodology Report (SMR) and its Addendum, which are set out in Volume 5: Appendix CT-001-001 and CT-001-002. The SMR Addendum contains the Land Quality Technical Note: Detailed methodology for contaminated land assessment.

3.1.3 At each of the above stages professional judgement has been used to check that the screening system is highlighting the most significant sites.

3.1.4 For those sites which pass through stage B, a further two stage (stages C and D) detailed risk assessment has been carried out in accordance with the methodology set out in the SMR.

3.1.5 The results of stage C are presented in three conceptual site models (CSM) as qualitative risk assessments (baseline, construction and post-construction). The construction and post-construction risk assessments assume that appropriate mitigation has been undertaken and that the operation of the railway is in accordance with environmental legislation.

3.1.6 Where nearby sites present a similar contamination risk, they may be grouped and considered together. This may be the case in the more urban areas where, for example, a light industrial estate may be considered as one site, rather than a number of individual sites. Similarly, in rural areas, small historical backfilled ponds and pits might be grouped together.

3.1.7 Where sites have been grouped together, only one CSM is prepared for the grouped sites.

3.1.8 The sites assessed in this study area are set out in Table 2. The site reference is the unique identifying number for the site, shown on the Volume 5, Land Quality Map Book.

Table 2: Sites included in the detailed risk assessment within the Whitmore Heath to Madeley area

Site reference	Name
4-9	Sandpit quarry
4-11	Former timber treatment works
4-18	Madeley Cemetery

4-19, 4-20, 4-21, 4-22, 4-28 and 4-29	Netherset Hey Lane Industrial Estate
4-36	West Coast Main Line (WCML) active lines Stableford to Whitmore
4-39	WCML active lines and disused lines Madeley to Wrinehill
4-62	Whitmore Heath historical landfill
4-65 and 4-66	Beechfields and Bowerend historical landfills
4-72	Former garage (A525 Bar Hill Road, Madeley)
4-73	East of railway cutting historical landfill
4-74	Reservoir historical landfill
4-85 and 4-45	Fuel storage at Netherset Hey Farm and Coney Greave

3.1.9 Contaminant types included within the risk assessments are based on the Department of the Environment, Farming and Rural Affairs (DEFRA) and Environment Agency (2002); Priority Contaminants Report CLR 8[1]. Although this report has been withdrawn by the Environment Agency, there is no authoritative document to replace it.

3.1.10 The remainder of this section presents the risk assessment for the sites going through to stage C and D of the assessment. These sites are shown on Maps LQ-01-113b to LQ-01-115a (Volume 5: Land quality Map Book).

3.1.11 The following abbreviation is used in these tables:

- PCB – polychlorinated biphenyls; and
- PAH – polynuclear aromatic hydrocarbons.

[1] Department for Environment, Food and Rural Affairs and Environment Agency (2002), *Potential Contaminants for the Assessment of Land.* R&D Publication CLR8

3.1 Baseline risk assessment

Table 3: 4-9 Sandpit quarry - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, ground gas and groundwater contamination from potential historical infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Principal bedrock aquifer (Zone 3 of ource protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Low	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

The main characteristics of this site are:

- the sandpit is located approximately 150m south of the A53 Newcastle Road. It is not directly located within the area required for construction;
- superficial deposits are absent in this area and the underlying bedrock is classified as a Principal aquifer;
- the site is located in a groundwater protection zone; and
- there are sensitive receptors within 50m of the site, including housing.

Table 4: 4-11 Former timber treatment works - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from timber treatment operations Potential for a range of organic and inorganic contaminants including but not limited to organochlorines including lindane and dieldrin, phenolic componds, organotin compounds, metal carboxylates, pyrethroids, creosote (which may contain PAH), copper/chrome/arsenic preparations, organic solvents and additives including organic resins and waxes, anti-bloom agents, water repellents, pigments and dyes	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Minor	Low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Description

The main characteristics of this site are:

- the former timber treatment works is located between Manor Road and the WCML. It is not within the area required for construction;
- superficial deposits are absent in this area, and the underlying bedrock is classified as a Secondary A aquifer;
- the site is not located in a groundwater protection zone; and
- there are no sensitive receptors within 50m of the site.

Table 5: 4-18 Madeley Cemetery - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination from burials Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, formaldehyde, nutrients and pathogens	On-site users Workers and members of the public	Direct contact, ingestion of dusts and vapours from contaminated soils	Unlikely (public) Low likelihood (workers)	Medium	Low (public) Moderate/low (worker)
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely (public) Low likelihood (workers)	Medium	Low (public) Moderate/low (worker)
	Off-site users Agricultural workers and residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

The main characteristics of this site are:

- Madeley Cemetery is located on Manor Road, Madeley. It is not directly located within the area required for construction;
- superficial deposits and underlying bedrock are classified as Secondary A aquifers;
- the site is not located in a groundwater protection zone; and
- there are no sensitive receptors within 50m of the site.

Table 6: 4-19, 4-20, 4-21, 4-22, 4-28 and 4-29 Netherset Hey Lane Industrial Estate - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination from fuel and lubricant storage/use, and other engineering related contaminants Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, hydrocarbons and asbestos	On-site users Workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Minor	Low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

The main characteristics of this site are:

- Netherset Hey Lane Industrial Estate is located between the WCML and Netherset Hey Lane. Part of this site (4-28 and 4-29) is located within the area required for construction;
- superficial deposits and the underlying bedrock are classified as Secondary A aquifers;
- the site is not located in a groundwater protection zone; and
- there are no sensitive receptors within 50m of the site.

Table 7: 4-36 WCML active lines Stableford to Whitmore - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from railway active line operations Potential for a range of organic and inorganic contaminants including but not limited to PAH, creosote (containing PAH), PCBs heavy metals, ethylene glycol, herbicides, ash and sulphate	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer (Zones 1 and 2 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters – surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

The main characteristics of this site are:

- WCML active lines (Stableford to Whitmore) are located between Chorlton Mill and Baldwin's Gate. The WCML active lines (Stableford to Whitmore) are not located within the area required for construction;
- superficial deposits are absent in this area, the underlying bedrock is classified as a Principal aquifer;
- the site is located in a groundwater protection zone; and
- there are sensitive receptors within 10m of the site, including housing.

Table 8: 4-39 WCML active lines and disused lines Madeley to Wrinehill - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from railway active line operations Potential for a range of organic and inorganic contaminants including but not limited to PAH, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Principal, Secondary A and Secondary B bedrock aquifers Secondary A superficial aquifer and unproductive strata	Leaching, vertical and lateral migration from contaminated soils and waters	Low Likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low Likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

The main characteristics of this site are:

- WCML active lines and disused lines are located between Snape Hall Farm to the northern border of the Whitmore Heath to Madeley area at Wrinehill Mill. Part of the WCML active lines and disused lines are located within the area required for construction;
- superficial deposits are classified as unproductive strata and a Secondary A aquifer. Superficial deposits are absent beneath the disused lines near Hey Sprink. The underlying bedrock are classified as Principal, Secondary A and Secondary B aquifers;
- the site is not located in a groundwater protection zone; and
- there are sensitive receptors within 50m of the site, including the River Lea.

Table 9: 4-62 Whitmore Heath historical landfill - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, ground gas and groundwater contamination from potential historic infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Residents	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer (Zone 3 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Medium	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

The main characteristics of this site are:

- Whitmore Heath historical landfill is located in Whitmore Heath, adjacent to Snape Hall Road. A small portion of the is located within the area required for construction;
- superficial deposits are absent in this area, and the underlying bedrock is classified as a Principal aquifer;
- the site is located in a groundwater protection zone; and
- there are sensitive receptors within 50m of the site, including housing.

Table 10: 4-65 and 4-66 Beechfields and Bowerend historical landfills- site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Principal and Secondary A bedrock aquifer Secondary A superficial aquifer and unproductive strata	Leaching, vertical and lateral migration from contaminated soils and waters	Unlikely	Severe	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Description

The main characteristics of this site are:

- Bowerend and Beechfields historical landfills are located to the west of Madeley;
- Beechfields landfill is not within the area required for construction. A small area of Bowerend Farm landfill is within the area required for construction;
- superficial deposits are classified as Secondary A aquifers and unproductive strata, and the underlying bedrock are classified as a Principal, Secondary A and Secondary B aquifers;
- the site is not located in a groundwater protection zone; and
- there are sensitive receptors within 50m of the site, including housing.

Table 11: 4-72 Former garage (A525 Bar Hill Road, Madeley) - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from historical fuel and oil storage Potential for a range of organic contaminants	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential /agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer Superficial deposits are unproductive strata	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

The main characteristics of this site are:

- Former garage is located on the A525 Bar Hill Road, Madeley. It is located within an area required for construction;
- superficial deposits are classified as unproductive strata, and the underlying bedrock is classified as a Secondary A aquifer;
- the site is not located in a groundwater protection zone; and
- there are no sensitive receptors within 10m of the site.

Table 12: 4-73 East of Railway Cutting historical landfill- site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, ground gas and groundwater contamination from potential historic infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential and public using public rights of way (PRoW)	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

The main characteristics of this site are:

- the East of Railway Cutting historical landfill is located to the west of Madeley. It is not within the area required for construction;
- superficial deposits and the underlying bedrock are both classified as a Secondary A aquifer;
- the site is not located in a groundwater protection zone; and
- there are sensitive receptors within 50m of the site, including housing.

Table 13: 4-74 Reservoir historical landfill- site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, ground gas and groundwater contamination from potential al infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Residential	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer Secondary A superficial aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Medium	Low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

The main characteristics of this site are:

- Reservoir historical landfill is located to the east of Baldwin's Gate. It is not within the area required for construction;
- half of the site is underlain by superficial deposits which are classified as a Secondary A aquifer. Superficial deposits are not present under the remainder of the site. The underlying bedrock is classified as a Principal aquifer;
- the site is located in a groundwater protection zone; and
- there are sensitive receptors within 10m of the site, including housing.

Table 14: 4-85 Fuel storage at Netherset Hey Farm and 4-45 Coney Greave - site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from fuel storage Potential for a range of organic contaminants	On-site users Residential	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential /agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer at Netherset Hey Farm Principal bedrock aquifer at Coney Greave (Zone 3 of source protection zone at Coney Greave)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

The main characteristics of this site are:

- there is evidence of fuel storage tanks located at Netherset Hey Farm and Coney Greave. The tank at Netherset Hey Farm is not within the area required for construction. The tank located at Coney Greave is adjacent to the area required for construction;
- superficial deposits are absent in these areas. The underlying bedrock is classified as a Secondary A aquifer at Netherset Hey Farm and a Principal aquifer at Coney Greave;
- the Netherset Hey Farm site is not located in a groundwater protection zone however the Coney Greave site is; and
- there are no sensitive receptors within 50m of the Netherset Hey Farm site. There are sensitive receptors within 50m of the Coney Greave site.

3.2 Construction risk assessment

Table 15: 4-9 Sandpit quarry - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, ground gas and groundwater contamination from potential historic infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Principal bedrock aquifer (Zone 3 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Severe	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- Sandpit Quarry is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- assumes historical infill without any lining, impermeable capping or leachate control systems in place;
- assumes that landfill material will not be disturbed during HS2 construction works;
- landfill footprint will not be disturbed during construction;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft Code of Construction Practice[2] (CoCP). Construction workers have been excluded from assessment due to the use of personal protective equipment (PPE)/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline; and
- assumes dewatering during construction could draw contamination into the groundwater, causing a temporary worsening in groundwater quality compared to baseline.

[2] Draft Code of Construction Practice, Volume 5: Appendix CT-003-000

Table 16: 4-11 Former timber treatment works - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from timber treatment operations Potential for a range of organic and inorganic contaminants including but not limited to organochlorines including lindane and dieldrin, phenolic compounds, organotin compounds, metal carboxylates, pyrethroids, creosote (which may contain PAH), copper/chrome/arsenic preparations, organic solvents and additives including organic resins and waxes, anti-bloom agents, water repellents, pigments and dyes	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Minor	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes the former timber treatment works is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002); and
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Table 17: 4-18 Madeley Cemetery - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination from burials Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, formaldehyde, nutrients and pathogens	On-site users Workers and members of the public	Direct contact, ingestion of dusts and vapours from contaminated soils	Unlikely (public) Low likelihood (workers)	Medium	Low (public) Moderate/low (worker)
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely (public) Low likelihood (workers)	Medium	Low (public) Moderate/low (worker)
	Off-site users Agricultural workers and residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes Madeley Cemetery is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline;
- assumes dewatering of borrow pits during construction could draw contamination into the groundwater, causing a temporary worsening in groundwater quality compared to baseline; and
- borrow pit dewatering discharge will be appropriately managed.

Table 18: 4-19, 4-20, 4-21, 4-22, 4-28 and 4-29 Netherset Hey Lane Industrial Estate - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination from fuel and lubricant storage/use, and other engineering related contaminants Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, hydrocarbons and asbestos	On-site users Workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Minor	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Minor	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assessment includes CA4-19 (Netherset Hey Industrial Estate), CA4-20 and CA4-21 (evidence of fuel storage tanks), CA4- 28 (railway goods yards, engine sheds and workshops) and CA4-22 and CA4-29 (borrow pits);
- assumes Netherset Hey Industrial Estate is partially located within the area required for construction and as such there is a potential for ground disturbance and remediation during the construction phase;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline;
- assumes dewatering during dewatering of borrow pit could draw contamination into the groundwater, causing a temporary worsening in groundwater quality compared to baseline; and
- borrow pit dewatering discharge will be appropriately managed.

Table 19: 4-36 WCML active lines Stableford to Whitmore - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from railway active line operations Potential for a range of organic and inorganic contaminants including but not limited to PAH, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer (Zones 1 and 2 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Severe	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Minor	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes the WCML active lines (Stableford to Whitmore) is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002); and
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Table 20: 4-39 WCML active lines and disused lines Madeley to Wrinehill - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from railway active line operations Potential for a range of organic and inorganic contaminants including but not limited to PAH, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer Principal and Secondary A superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Minor	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes portions of the WCML active lines and disused lines are located within the area required for construction and as such there is a potential for ground disturbance and remediation during the construction phase;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002); and
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Table 21: 4-62 Whitmore Heath historical landfill - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfills Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH.	On-site users Residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer (Zone 3 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Severe	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Medium	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- assumes Whitmore Heath historical landfill is partially within the area required for construction and as such there is a potential for ground disturbance and remediation during the construction phase;
- assumes historical infill exists without any lining, impermeable capping or leachate control systems in place;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline; and
- assumes dewatering during construction could draw contamination into the groundwater, causing a temporary worsening in groundwater quality compared to baseline.

Table 22: 4-65 and 4-66 Beechfields and Bowerend historical landfills - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfills Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases	Likely	Medium	Moderate
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Principal and Secondary A bedrock aquifers Secondary A superficial aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes only a small section of Bowerend Farm historical landfill is within the area required for construction. Beechfields Farm landfill is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline;
- assumes historical infill exists without any lining, impermeable capping or leachate control systems in place;
- assumes dewatering during construction could draw contamination into the groundwater, causing a temporary worsening in groundwater quality compared to baseline;
- ground investigation will be required prior to construction; and
- assumes construction phase includes remediation that may be required.

Table 23: 4-72 Former garage (A525 Bar Hill Road, Madeley) - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from historical fuel and oil storage Potential for a range of organic contaminants	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential /agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes that the former garage is located within the area required for construction and as such there is a potential for ground disturbance and remediation during the construction phase;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002); and
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Table 24: 4-73 East of Railway Cutting historical landfill - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, ground gas and groundwater contamination from potential historic infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential and public using PRoW	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- assumes the East of Railway Cutting historical landfill is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- assumes that residual landfill material will not be disturbed during HS2 construction works;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline;
- assumes historical infill without any lining, impermeable capping or leachate control systems in place; and
- assumes dewatering during construction works along the WCML will not be required.

Table 25: 4-74 Reservoir historical landfill - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfills Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer Secondary A superficial aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Medium	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- assumes the Reservoir historical landfill is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation;
- assumes landfill was remediated before houses built;
- assumes further site remediation is not required as part of Proposed Scheme;
- assumes that residual landfill material will not be disturbed during HS2 construction works;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002);
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline;
- assumes historical infill exists without any lining, impermeable capping or leachate control systems will be put in place; and
- assumes dewatering during construction could draw contamination into the groundwater, causing a temporary worsening in groundwater quality compared to baseline.

Table 26: 4-85 Fuel storage at Netherset Hey Farm and 4-45 Coney Greave - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from fuel storage Potential for a range of organic contaminants	On-site users Residential	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential /agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer at Netherset Hey Farm Principal bedrock aquifer at Coney Greave (Zone 3 of Source protection zone at Coney Greave)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes the fuel storage tank at Netherset Hey Farm is not located within the area required for construction and as such minimal impact from construction is anticipated, including minimal requirement for remediation. The fuel storage tank at Coney Greave is partially located within the area required for construction and as such there is a potential for ground disturbance and remediation during the construction phase;
- during construction standard mitigation procedures are assumed to be implemented in accordance with the draft CoCP. Construction workers have been excluded from assessment due to the use of PPE/risk management protocols and in accordance with the Land quality Technical Note in the SMR Addendum (Volume 5: Appendix CT-001-002); and
- whilst the draft CoCP will make it unlikely that there will be adverse consequences associated with construction e.g. the control of surface runoff and dust, it is considered that there may still be temporary minor adverse effects during the construction period from ground disturbance in these areas. The adoption of the draft CoCP generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

3.3 Post-construction risk assessment

Table 27: 4-9 Sandpit quarry - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, ground gas and groundwater contamination from potential historic infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Principal Bedrock aquifer (Zone 3 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water,	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/Assumptions

- assumes no remediation works are undertaken as part of Proposed Scheme; and
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction.

Table 28: 4-11 Former timber treatment works - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from timber treatment operations Potential for a range of organic and inorganic contaminants including but not limited to organochlorines including lindane and dieldrin, phenolic compounds, organotin compounds, metal carboxylates, pyrethroids, creosote (which may contain PAH), copper/chrome/arsenic preparations, organic solvents and additives including organic resins and waxes, anti-bloom agents, water repellents, pigments and dyes	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Minor	Low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes no remediation works are undertaken as part of Proposed Scheme; and
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction.

Table 29: 4-18 Madeley Cemetery - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination from burials Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, formaldehyde, nutrients and pathogens	On-site users Workers and members of the public	Direct contact, ingestion of dusts and vapours from contaminated soils	Unlikely (public) Low likelihood (workers)	Medium	Low (public) Moderate/low (worker)
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely (public) Low likelihood (workers)	Medium	Low (public) Moderate/low (worker)
	Off-site users Agricultural workers and residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes no remediation works are undertaken as part of Proposed Scheme; and
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction.

Table 30: 4-19, 4-20, 4-21, 4-22, 4-28 and 4-29 Netherset Hey Lane Industrial Estate - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination from fuel and lubricant storage/use, and other engineering related contaminants Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, hydrocarbons and asbestos	On-site users Workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Minor	Low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assessment includes CA4-19 (Netherset Hey Lane Industrial Estate), CA4-20 and CA4-21 (evidence of fuel storage tanks), CA4- 28 (railway goods yards, engine sheds and workshops) and CA4- 22 and CA4-29 (borrow pits);
- assumes no remediation works are undertaken as part of the Proposed Scheme;
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- assumes that groundwater does not come to the surface following backfilling of borrow pits.

Table 31: 4-36 WCML active lines Stableford to Whitmore - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from railway active line operations Potential for a range of organic and inorganic contaminants including but not limited to PAH), creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer (Zones 1 and 2 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 32: 4-39 WCML active lines and disused lines Madeley to Wrinehill - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from railway active line operations Potential for a range of organic and inorganic contaminants including but not limited to PAH, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer Principal and Secondary A superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Minor	Low
	Property receptors – buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 33: 4-62 Whitmore Heath historical landfill - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfills Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Residential	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Principal bedrock aquifer (Zone 3 of source protection zone)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Low likelihood	Medium	Moderate/low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- assumes remediation required has been undertaken and construction works are complete;
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 34: 4-65 and 4-66 Beechfields and Bowerend historical landfills - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfills Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Off-site users Residential/farming	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – groundwater Principal and Secondary A bedrock aquifer Secondary A superficial aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Unlikely	Severe	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes remediation required has been undertaken and construction works are complete;
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction;
- historical landfills assumed unlikely to have lining, impermeable capping or leachate control systems in place; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 35: 4-72 Former garage (A525 Bar Hill Road, Madeley) - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from fuel and oil storage Potential for a range of organic contaminants	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Off-site user Residential /agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Unlikely	Medium	Low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- assumes site is remediated as part of construction works;
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 36: 4-73 East of Railway Cutting historical landfill - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, ground gas and groundwater contamination from potential historic infill Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Agricultural workers	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users Residential and public using PRoW	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Controlled waters – groundwater Secondary A bedrock and superficial aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- assumes no remediation works are undertaken as part of Proposed Scheme;
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 37: 4-74 Reservoir historical landfill post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, ground gas and groundwater contamination from historical landfills Potential for a range of organic and inorganic contaminants including but not limited to heavy metals, ammonia, ground gases (methane, carbon dioxide) and organics such as PAH	On-site users Residents	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases	Unlikely	Medium	Low
	Controlled waters – Principal bedrock aquifer Secondary A superficial aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Medium	Low
	Property receptors – buildings, foundations and services (off-site)	Exposure to explosive gases	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Negligible	Very low

Description

Notes/assumptions

- assumes landfill was remediated before houses built;
- assumes further site remediation is not required as part of Proposed Scheme;
- also assumes that residual landfill material will not be disturbed during HS2 construction works; and
- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction.

Table 38: 4-85 Fuel storage at Netherset Hey Farm and 4-45 Coney Greave - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from fuel storage Potential for a range of organic contaminants	On-site users Residential	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential /agricultural workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters – groundwater Secondary A bedrock aquifer at Netherset Hey Farm Principal bedrock aquifer at Coney Greave (Zone 3 of source protection zone at Coney Greave)	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Severe	Moderate
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Unlikely	Minor	Very low
	Property receptors – buildings, foundations and services	Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Description

Notes/assumptions

- 'on-site users' excludes rail passengers (as whilst within trains, they will at all routine times be within a controlled environment) and maintenance workers; but includes people at stations/depots or in areas returned to public land after construction; and
- a range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

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

Table 39: 4-9 Sandpit quarry - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to inhalation of ground gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to inhalation of ground gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of Principal bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate	High	Moderate	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Very low	Very low	Neutral effect	Neutral effect
Exposure of property to explosive gases	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate	High	Moderate		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 40: 4-11 Former timber treatment works - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils.	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Very low	Very low	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Low	Low	Low	Neutral effect	Neutral effect
Main risk	Moderate/low	Moderate/low	Moderate/low		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 41: 4-18 Madeley Cemetery - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Low (public) Moderate/low (workers)	Low (public) Moderate/low (workers)	Low (public) Moderate/low (workers)	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low (public) Moderate low (workers)	Low (public) Moderate/low (workers)	Low (public) Moderate/low (workers)	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A superficial and bedrock aquifers to leaching, vertical and lateral migration from contaminated soils and waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Very low	Very low	Neutral effect	Neutral effect
Exposure of property to explosive gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate/ low	Moderate	Moderate/low		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 42: 4-19, 4-20, 4-21, 4-22, 4-28 and 4-29 Netherset Hey Lane Industrial Estate – site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to inhalation of ground gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to inhalation of ground gases	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A superficial and bedrock aquifers to leaching, vertical and lateral migration from contaminated soils and waters	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of property to explosive gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate/low	Moderate/low	Moderate/low		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 43: 4-36 WCML active lines Stableford to Whitmore - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Principal bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate	High	Moderate	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate	High	Moderate		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 44: 4-39 WCML active lines and disused lines - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils.	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A superficial and bedrock aquifers to leaching, vertical and lateral migration from contaminated soils and waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate/low	Moderate	Moderate/low		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 45: 4-62 Whitmore Heath historical landfill - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to inhalation of ground gases.	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to inhalation of ground gases	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Principal bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate	High	Moderate	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of property to explosive gases	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate	High	Moderate		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 46: 4-65 and 4-66 Beechfields and Bowerend historical landfill sites - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors (workers) to inhalation of ground gases	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to inhalation of ground gases	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of Principal bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Low	Very low	Minor adverse effect	Neutral effect
Exposure of property to explosive gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Low	Low	Low	Neutral effect	Neutral effect
Main risk	Moderate/low	Moderate	Moderate/low		
Overall significance				Neutral effect to minor adverse effect	Neutral effect to minor beneficial effect

Table 47: 4-72 Former garage (A525 Bar Hill Road, Madeley) - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Very low	Very Low	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate/low	Moderate	Low		
Overall significance				Minor adverse effect to neutral effect	Neutral effect to minor beneficial effect

Table 48: 4-73 East of Railway Cutting historical landfill - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to inhalation of ground gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to inhalation of ground gases	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of Secondary A superficial and bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Very low	Very low	Neutral effect	Neutral effect
Exposure of property to explosive gases	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate	Moderate	Moderate		
Overall significance				Neutral effect to minor adverse effect	Neutral effect

Table 49: 4-74 Reservoir historical landfill - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to inhalation of ground gases.	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to inhalation of ground gases	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Principal aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate/low	Moderate	Moderate	Minor adverse effect	Minor adverse effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of property to explosive gases	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate	Moderate	Moderate		
Overall significance				Neutral effect to minor adverse effect	Neutral effect to minor adverse effect

Table 50: 4-85 Fuel storage at Netherset Hey Farm and 4-45 Coney Greave - site significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors (workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors (residential and workers) to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A bedrock aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Very low	Very low	Very low	Neutral effect	Neutral effect
Direct contact of property with contaminants in soil and surface water/groundwater	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate	Moderate	Moderate		
Overall significance				Neutral effect	Neutral effect

4 Geological sites of special scientific interest and local geological sites

4.1.1 No geological SSSI or local geological sites are present in the Whitmore Heath to Madeley area.

5 Mining and minerals data

5.1.1 This appendix presents the following data relating to mining and minerals information:

- details of planning data for minerals sites; and
- number of marl pits in each study area.

5.1.2 The remainder of this section presents this data for relevant sites.

5.1.3 The Minerals Local Plan for Staffordshire 2015 to2030 (2017)[3] shows that the route passes through one mineral safeguarding area (MSA) for sand and gravel extraction in a number of sections, which is shown in Maps LQ-01- 113b to LQ-01-115a.

5.1.4 The Minerals Local Plan for Staffordshire 2015 to2030 also indicates the route passes though the PEDL40 and PEDL56 Petroleum Licence Areas.

5.1.5 There are no identified historical marl pits in the study area.

[3] Staffordshire County Council (2017),*The Minerals Local Plan for Staffordshire 2015 to 2030*, adopted 16 February 2017

6 References

British Geological Survey (2009), *A lithostratigraphical framework for the Carboniferous successions of southern Great Britain (onshore)*. Available online at: http://nora.nerc.ac.uk/8281/1/RR09001.pdf.

British Geological Survey, *Geoindex Onshore.* Available online at: http://mapapps2.bgs.ac.uk/geoindex/home.html?submit=Open+the+onshore+GeoIndex.

British Geological Survey (2016), *Geology of Britain viewer.* Available online at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html.

British Geological Survey, *Lexicon of Named Rock Units*. Available online at: http://www.bgs.ac.uk/Lexicon/.

British Geological Survey (2014), *Lithostratigraphy of the Sherwood Sandstone. Research Report RR/14/01.* Available online at: http://www.bgs.ac.uk/downloads/start.cfm?id=2904.

British Standards Institute (2011), *Investigation of Potentially Contaminated Sites BS10175+A1:2013.*

British Standards Institute (2013), *Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) BS8576:2013.*

Department for Environment, Food and Rural Affairs and Environment Agency (2002), *Potential Contaminants for the Assessment of Land. Contaminated Land Report 8* (withdrawn).

Environment Agency, *Groundwater Source Protection Zone definition*. Available online at: http://apps.environment-agency.gov.uk/wiyby/37833.aspx.

Environment Agency, *Data on pollution incidents and landfill sites*. Available online at: http://maps.environment-agency.gov.uk/wiyby.

Environment Agency (2004), *Model Procedures for the Management of Land Contamination. Contaminated Land Report 11.* Available online at: http://www.claire.co.uk/information-centre/water-and-land-library-wall/45-model-procedures/187-model-procedures.

Joint Nature Conservation Council, *List of Geological Conservation Review sites for Staffordshire County Council.* Available online at: http://jncc.defra.gov.uk/default.aspx?page=4177&authority=UKG24.

Oil and Gas Authority, *Recent licences.* Available online at: https://itportal.decc.gov.uk/web_files/recent_licences/oglicences.htm.

Public Health England, *UK maps of radon*. Available online at: www.ukradon.org/information/ukmaps.

Staffordshire County Council (1999), *Staffordshire and Stoke-on-Trent Minerals Local Plan 1994-2006* (adopted December 1999). Available online at: https://apps2.staffordshire.gov.uk/SCC/TrimDocProvider/?ID=003/07/06/01/197.

Staffordshire County Council *'On the Map' online planning, minerals and landfill information.* Available online at: https://apps2.staffordshire.gov.uk/WEB/OnTheMap/planning.

Staffordshire County Council (2015), *Staffordshire County Council New Minerals Local Plan for Staffordshire 2015-2030*. Final draft. Available online at: https://consultation.staffordshire.gov.uk/environment/staffordshire-minerals-local-plan/user_uploads/0100-the-new__---june-2015.pdf.

Staffordshire County Council (2015), *'Pre-Operational', 'Operational' and 'Non-Operational' Mineral Sites in Staffordshire. Arranged by mineral type. March 2015*. Available online at: https://www.staffordshire.gov.uk/environment/planning/policy/mineralsites/Updated-Minerals-Weblist-report-March-2015.pdf.

Staffordshire County Council (2017), *The Minerals Local Plan for Staffordshire 2015 to 2030*, adopted 16 February 2017. Available online: https://www.staffordshire.gov.uk/environment/planning/policy/thedevelopmentplan/mineralslocalplan/mineralsLocalPlan.aspx.

Staffordshire Ecology, *List of Local Geological/Geomorphological Sites (LoGS)*. Available online at: http://srigs.staffs-ecology.org.uk/index.html.

Sustainable Remediation Forum UK (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation.*

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

08081 434 434
HS2Enquiries@hs2.org.uk

E150