



High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Technical appendices

CA5: South Cheshire

Land quality report (LQ-001-005)



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Department for Transport

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1 Introduction

1.1.1 The document is an Appendix to the land quality assessment for South Cheshire community area (CA5), 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 the land quality Appendix are contained in the Volume 5 Land Quality Map Book (map references LQ-01-115b to LQ-01-118).

2 Engagement

2.1.1.1 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 South Cheshire 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 South Cheshire area

Local authority or other organisation	Method/ dates of contact	Information provided and/or specific concerns
Cheshire East Council (CEC)	Meeting (18 March 2016) Email (18 January 2017) Telephone (18 January 2017)	Discussions were held with CEC regarding contaminated land sites within that part of the study area located within their local authority. A telephone discussion was held regarding the status of the CEC Minerals Plan. CEC confirmed that the Minerals Plan on their website is still current.
Environment Agency	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 was held to discuss technical geological issues affecting the Proposed Scheme, including aquifer information (groundwater chemistry and vulnerability) and mineral resources.

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 (CSMs) 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.

Table 2: Sites included in the detailed risk assessment within the South Cheshire area

Site reference	Name
5-29	Historical landfill adjacent to Den Lane (former Betley Ash Quarry)
5-45 and 5-48	Brickfield refuse tip and brickfield
5-55	Historical landfill at Gonsley Green Farm
5-65 and 5-110	Railway infrastructure (West Coast Main Line (WCML) and

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	Basford Sidings)
5-94 and 5-234	Former petrol filling station (Hough Garage) and operational petrol filling station (Crewe Arms Express)
5-101	Historical landfill site 160m south-west of Weston Hall
5-116	Historical landfill at Yew Tree Farm
5-107, 5-166, 5-168, 5-201, 5-207, 5-210, 5-213, 5-220, 5-222, 5-223, 5-249, 5-250 and 5-255	Evidence of fuel storage in Basford and Crewe areas – zone 1 and zone 2
5-177, 5-243, 5-244, 5-248 and 5-252	Railway infrastructure/ engineering facilities and other engineering facilities in zone 1 and zone 2 in Basford/Crewe area
5-178, 5-182, 5-186, 5-203, 5-204, 5-205, 5-208, 5-245 and 5-253	Railway infrastructure/ engineering facilities and other engineering facilities in zone 1 and zone 2 in Basford/Crewe area
5-202 and 5-209	Former iron and steel works
5-227	Former petrol filling station (Nantwich Road)
5-239	British Railways Tip
5-246	Train refuelling island, Crewe

- 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 8¹. 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-01-115b to LQ-01-118, (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: 5-29 historical landfill adjacent to Den Lane (former Betley Ash 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Occasional workers and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential, farming and recreational use	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 and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary B bedrock aquifer and unproductive strata	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 Entry into land drain to south of site	Low likelihood	Minor	Low
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems- Betley Mere SSSI Midland Meres and Mosses Phase 1 Ramsar site	Lateral migration through groundwater Direct run-off from site Entry into land drain to south of site	Unlikely	Medium	Low

Description

The main characteristics of the site are:

- the historical landfill is adjacent to the west of WCML and south of Den Lane. It is located within the area required for construction;
- superficial deposits are classified as Secondary A aquifer, and the underlying bedrock is classified as Secondary B aquifer and unproductive strata;
- the site is not located in a groundwater source protection zone;
- Betley Mere, a SSSI, and part of a Phase 1 Ramsar site, are located approximately 390m to east, on the eastern side of the WCML; and
- there are sensitive receptors within 50m of the site, including residential housing.

Table 4: 5-45 brickfield refuse tip and 5-48 brickfield – 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 Occasional farm workers	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 and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial and bedrock strata	Leaching, vertical and lateral migration from contaminated soils and waters	Unlikely	Negligible	Very 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 and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems- Midland Meres and Mosses Phase 1 Ramsar site	Lateral migration through groundwater Surface water	Unlikely	Medium	Low

Description

The main characteristics of this site are:

- the historical brickfield refuse tip and brickfield are located to the north of Den Lane. It is located within the area required for construction;
 - superficial deposits and the underlying bedrock are classified as unproductive strata;
 - the site is not located in a groundwater protection zone; and
 - there are no sensitive receptors within 10m of the site.
-

Table 5: 5-55 historical landfill at Gonsley Green Farm – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
<p>Soil, leachate, ground gas and groundwater contamination from historical landfill</p> <p>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</p>	<p>On-site users</p> <p>Occasional farm workers</p>	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 and vapours	Low likelihood	Medium	Moderate/low
	<p>Off-site users</p> <p>Residential, farming and recreational use</p>	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 and vapours	Low likelihood	Medium	Moderate/low
	<p>Controlled waters - groundwater</p> <p>Unproductive bedrock and superficial deposits</p>	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Negligible	Very low
	<p>Controlled waters - surface water</p>	<p>Lateral migration through groundwater</p> <p>Direct run-off from site</p>	Unlikely	Minor	Very low
	<p>Property receptors - buildings, foundations and services (off-site)</p>	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the historical landfill at Gonsley Green Farm is north of Den Lane. It is not directly located within the area required for construction;
 - superficial deposits and bedrock are classified as unproductive strata;
 - the site is not located in a groundwater protection zone; and
 - there are sensitive receptors within 50m of the site, including housing.
-

Table 6: 5-65 and 5-110 railway infrastructure (WCML and Basford Hall sidings) – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from railway running line and siding operations Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAH) polychlorinated biphenyls 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
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential and 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 superficial aquifer and unproductive strata Secondary B bedrock aquifer and unproductive strata Groundwater abstraction Grange Farm	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)	Exposure of property to gases and vapours	Unlikely	Negligible	Very low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems - Betley Mere SSSI and Midland Meres and Mosses Phase 1 Ramsar site	Groundwater migration Surface water migration	Unlikely	Medium	Low

Description

The main characteristics of this site are:

- the railway infrastructure is located from south of Checkley Lane to Weston Lane. It is located within the area required for construction;
 - superficial deposits are classified as Secondary A and unproductive strata, and the underlying bedrock is classified as Secondary B and unproductive strata;
 - the site is not located in a groundwater protection zone;
 - there are sensitive receptors within 50m of the site, including residential housing; and
 - Betley Mere, a SSSI and part of a Phase 1 Ramsar site, is located approximately 220m to the east on the eastern side of the WCML.
-

Table 7: 5-94 former petrol filling station (Hough Garage) and 5-234 operational petrol filling station (Crewe Arms Express) – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Free phase and dissolved phase hydrocarbons	On-site users Workers and members of the public	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 and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential and workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water Surface water abstraction 800m east of site	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 and vapours	Low likelihood	Severe	Moderate

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the former petrol filling station is located on Cobbs Lane, Hough. The operational petrol filling station is located on Macon Way, Crewe. The sites are not located within the area required for construction;
 - at both sites the superficial deposits are classified as Secondary A aquifer, and the underlying bedrock is classified as a Secondary B aquifer;
 - the sites are not located in a groundwater protection zone; and
 - there are sensitive receptors within 10m of the site at Hough, including housing.
-

Table 8: 5-101 historical landfill site 160m south-west of Weston Hall – 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Occasional farm workers, recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer Unproductive bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the historical landfill site 160m south-west of Weston Hall . It is located within the area required for construction;
 - superficial deposits are classified as a Secondary A aquifer, and the underlying bedrock is classified as unproductive strata;
 - the site is not located in a groundwater protection zone; and
 - there are no sensitive receptors within 50m of the site.
-

Table 9: 5-116 historical landfill at Yew Tree Farm – 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Occasional farm workers and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential, farming and recreational use	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 and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary A and Secondary B bedrock aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run /erosion from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the historical landfill at Yew Tree Farm is located to the west of Weston and along the eastern bank of Basford Brook. It is not located within the area required for construction;
 - superficial deposits are classified as a Secondary A aquifer, and the underlying bedrock is classified as Secondary A and Secondary B aquifers;
 - the site is not located in a groundwater protection zone; and
 - there are sensitive receptors within 10m of the site, including housing and Basford Brook.
-

Table 10: 5-107, 5-166, 5-168, 5-201, 5-207, 5-210, 5-213, 5-220, 5-222, 5-223, 5-249, 5-250 and 5-255 evidence of fuel storage in Basford and Crewe areas in zone1 and zone 2 – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from historical and recent fuel spillages Potential for a range of petroleum hydrocarbons to be present	On-site users Workers	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
	Off-site users Residential and 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 Unproductive superficial deposits Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Minor	Moderate/low
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Minor	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the fuel storage at Basford and Crewe are located within the area required for construction;
 - superficial deposits are classified as unproductive strata, and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are no sensitive receptors within 50m of these sites.
-

Table 11: 5-177, 5-243, 5-244, 5-248, 5-252 railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
<p>Soil, leachate, and groundwater contamination from railway running lines siding operations, rail engineering works, and other engineering works</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Residential and agricultural workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters - groundwater	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Secondary A superficial aquifer and unproductive strata				
	Secondary B bedrock aquifer				
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
Property receptors - buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Minor	Low	
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the railway infrastructure / engineering facilities and other engineering facilities are located between Weston Lane and to the north of Crewe Station. Some sites are located within the area required for construction;
 - superficial deposits are classified as a Secondary A aquifer and unproductive strata and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are sensitive receptors within 50m of the sites, including housing, Basford Brook, Valley Brook and sports grounds.
-

Table 12: 5-178, 5-182, 5-186, 5-203, 5-204, 5-205, 5-208, 5-245 and 5-253, railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
<p>Soil, leachate, and groundwater contamination from railway running lines siding operations, rail engineering works, and other engineering works</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAHs), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Residential and agricultural workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters - groundwater	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Minor	Moderate/low
	Unproductive superficial aquifer				
	Secondary B bedrock aquifer				
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
Property receptors - buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Minor	Low	
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the railway infrastructure / engineering facilities and other engineering facilities are located between north of Basford Rail Sidings and south of Crewe Station. Some sites are located within the area required for construction;
 - superficial deposits are classified as unproductive strata, and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are sensitive receptors within 50m of the sites, including housing.
-

Table 13: 5-202 and 5-209 former iron and steel works – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Potential contaminants associated with iron and steel works include metals, asbestos, inorganic compounds such as sulphates, phosphates, sulphides, cyanides, thiocyanides and fluorides, acids and alkalis, hydrocarbons and coal tars if coking works were present	On-site users Workers and members of the public	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 and vapours	Unlikely	Medium	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Low likelihood	Minor	Low
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the former iron and steel works is located between Weston Road, Crewe and the WCML. It is not located within the area required for construction;
 - superficial deposits are classified as a unproductive strata, and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are no sensitive receptors within 50m of the site.
-

Table 14: 5-227 former petrol filling station (Nantwich Road) – site baseline CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Free phase and dissolved phase hydrocarbons	On-site users Workers and 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 and vapours	Low likelihood	Medium	Moderate/low
	Off-site users 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	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Unproductive superficial aquifer Secondary B 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)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate /low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the former petrol filling station is located to the south of Nantwich Road. It is not located within the area required for construction;
 - superficial deposits are classified as a unproductive strata, and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are sensitive receptors within 50m of the site, including housing.
-

Table 15: 5-239 British Railways Tip – 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Workers and recreational users	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential and 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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer and unproductive strata Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the historical British Railways Tip is located north of Crewe Train Station, to the west of Macon Way. It is partially located within the area required for construction;
 - superficial deposits are classified as a Secondary A aquifer and unproductive strata, and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are sensitive receptors within 10m of the site, including Valley Brook which flows through the site.
-

Table 16: 5-246 Train refuelling island, Crewe – site baseline CSM and qualitative risk assessment-

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate, and groundwater contamination from historical and recent fuel spillages Potential for a range of petroleum hydrocarbons to be present	On-site users Workers	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
	Off-site users 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 superficial aquifer and unproductive strata Secondary B 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	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Minor	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

The main characteristics of this site are:

- the train refuelling island is located to the east of Basford Hall Sidings between Weston Lane and to the north of Crewe Train Station. The site is not located within the area required for construction;
 - superficial deposits are classified as a Secondary A aquifer and unproductive strata, and the underlying bedrock is classified as a Secondary B aquifer;
 - the site is not located in a groundwater protection zone; and
 - there are no sensitive receptors within 50m of the site, however Basford Brook is culverted below this site.
-

3.2 Construction risk assessment

Table 17: 5-29 historical landfill adjacent to Den Lane (former Betley Ash 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Occasional workers and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases and vapours	Likely	Medium	Moderate
	Off-site users Residential, farming and recreational use	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 and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Secondary A superficial Secondary B bedrock aquifer and unproductive strata	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water				
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
Direct contact with contaminated soils and waters		Unlikely	Medium	Low	

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Sensitive ecosystems - Betley Mere SSSI Midland Meres and Mosses Phase 1 Ramsar site	Lateral migration through groundwater Direct run-off from site Entry into land drain to south of site	Low likelihood	Medium	Moderate/low

Description

Notes/assumptions

- the historical landfill adjacent to Den Lane (former Betley Ash Quarry) is located 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 without any lining, impermeable capping or leachate control systems in place;
- during construction standard mitigation procedures are assumed to be in accordance with the draft Code of Construction Practice² (CoCP). Construction workers have been excluded from the 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 18: 5-45 brickfield refuse tip and 5-48 brickfield - 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Occasional farm workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases and vapours	Likely	Medium	Moderate
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial and bedrock aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Negligible	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 and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Sensitive ecosystems - Midland Meres and Mosses Phase 1 Ramsar sites	Lateral migration through groundwater Surface water	Low likelihood	Medium	Moderate/low

Description

Notes/assumptions

- the historical brickfield refuse tip and brickfield is located 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 without any lining, impermeable capping or leachate control systems in place;
- during construction standard mitigation procedures are assumed to be in accordance with the draft CoCP. Construction workers have been excluded from the 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 19: 5-55 historical landfill at Gonsley Green Farm - 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Occasional farm workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential and 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	Unlikely	Medium	Low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Unproductive bedrock and superficial deposits	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Negligible	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 and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the historical landfill at Gonsley Green Farm is adjacent to but 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;
 - during construction standard mitigation procedures are assumed to be in accordance with the draft CoCP. Construction workers have been excluded from the 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);
 - assumes that landfill material will not be disturbed during HS2 construction works;
 - 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 20: 5-65 and 5-110 railway infrastructure (WCML and Basford Sidings) - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction stage with mitigation
<p>Soil, leachate, and groundwater contamination from railway running line and siding operations</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Residential and agricultural workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters - groundwater	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Secondary A superficial aquifer and unproductive strata				
	Secondary B bedrock aquifer and unproductive strata	Groundwater abstraction Grange Farm	Lateral migration through groundwater	Likely	Minor
Controlled waters - surface water	Direct run-off from site				
Property receptors - buildings, foundations and services (off-site)	Exposure of property to gases and vapours	Unlikely	Negligible	Very low	

Source	Receptor	Pathway	Probability	Consequence	Risk at construction stage with mitigation
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low
	Sensitive ecosystems - Most sensitive receptors are Betley Mere SSSI and Midland Meres and Mosses Ramsar sites	Groundwater migration Surface water migration	Low Likelihood	Medium	Moderate/low

Description

Notes/assumptions

- the railway infrastructure 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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 21: 5-94 former petrol filling station (Hough Garage) and 5-234 operational petrol filling station (Crewe Arms Express) - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction stage with mitigation
Free phase and dissolved phase hydrocarbons	On-site users Workers and members of the public	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 and vapours	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	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	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 and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate /low

Source	Receptor	Pathway	Probability	Consequence	Risk at construction stage with mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the former and operational petrol filling stations are 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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: 5-101 historical landfill site 160m south-west of Weston Hall - 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Occasional farm workers and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases and vapours	Likely	Medium	Moderate
	Off-site users Residential, farming and recreational use	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A aquifer superficial aquifer Unproductive bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Severe	High
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the historical landfill located 160m southwest of at Weston Hall is located 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 without any lining, impermeable capping or leachate control systems in place;
 - assumes that landfill material will not be disturbed during HS2 construction works;
 - during construction standard mitigation procedures are assumed to be in accordance with the draft CoCP. Construction workers have been excluded from the 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 23: 5-116 historical landfill at Yew Tree Farm - 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Occasional farm workers and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
		Inhalation of ground gases and vapours	Likely	Medium	Moderate
	Off-site users Residential, farming and recreational use	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 and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary A and Secondary B bedrock aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water				
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the historical landfill at Yew Tree Farm 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;
 - during construction standard mitigation procedures are assumed to be in accordance with the draft CoCP. Construction workers have been excluded from the 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);
 - assumes that landfill material will not be disturbed during HS2 construction works;
 - 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 24: 5-107, 5-166, 5-168, 5-201, 5-207, 5-210, 5-213, 5-220, 5-222, 5-223, 5-249, 5-250 and 5-255 evidence of fuel storage Basford and Crewe areas- zone 1 and zone 2 - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from historical and recent fuel spillages Potential for a range of petroleum hydrocarbons to be present	On-site users 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
	Off-site users Residential and 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 Unproductive superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Minor	Moderate
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- some sites where there is evidence of fuel storage are 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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 25: 5-177, 5-243, 5-244, 5-248, 5-252 railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area - construction CSM and qualitative risk assessment-

Source	Receptor	Pathway	Probability	Consequence	Risk at construction stage with mitigation
<p>Soil, leachate, and groundwater contamination from railway running lines siding operations, rail engineering works, and other engineering works</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAHs), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
	Off-site users Residential and 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 superficial aquifer and unproductive strata Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Minor	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable

Description

Notes/assumptions

- the railway infrastructure and engineering facilities 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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 26: 5-178, 5-182, 5-186, 5-203, 5-204, 5-205, 5-208, 5-245 and 5-253, railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk at construction stage with mitigation
<p>Soil, leachate, and groundwater contamination from railway running lines siding operations, rail engineering works, and other engineering works</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Likely	Medium	Moderate
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Likely	Medium	Moderate
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Residential and agricultural workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters - groundwater	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Minor	Moderate
	Unproductive superficial aquifer				
	Secondary B bedrock aquifer				
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
Property receptors - buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Minor	Low	
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the railway infrastructure and engineering facilities 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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 27: 5-202 and 5-209 former iron and steel works - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Potential contaminants associated with iron and steel works include metals, asbestos, inorganic compounds such as sulphates, phosphates, sulphides, cyanides, thiocyanides and fluorides, acids and alkalis, hydrocarbons and coal tars if coking works were present	On-site users Workers and members of the public	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 and vapours	Unlikely	Medium	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial aquifer Secondary B 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	Low likelihood	Minor	Low
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the former iron and steel 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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 28: 5-227 former petrol filling station (Nantwich Road) - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Free phase and dissolved phase hydrocarbons	On-site users Workers and 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 and vapours	Low likelihood	Medium	Moderate/low
	Off-site users 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	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Controlled waters - groundwater Unproductive superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Minor	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 and vapours	Low likelihood	Severe	Moderate

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate /low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the former petrol filling station on Nantwich Road 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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 29: 5-239 British Railways Tip - 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Workers and recreational users	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Low likelihood	Medium	Moderate/low
	Off-site users Residential and 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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer and unproductive strata Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the historical British Railways Tip 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;
- assumes historical infill without any lining, impermeable capping or leachate control systems in place;
- during construction standard mitigation procedures are assumed to be in accordance with the draft CoCP. Construction workers have been excluded from the 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 30: 5-246 Train refuelling island, Crewe - construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate, and groundwater contamination from historical and recent fuel spillages Potential for a range of petroleum hydrocarbons to be present	On-site users Workers	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Likely	Medium	Moderate
		Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users 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 superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	High likelihood	Medium	High
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Minor	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- the train refuelling island at Crewe 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 in accordance with the draft CoCP. Construction workers have been excluded from the 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.
-

3.3 Post–construction risk assessment

Table 31: 5-29 historical landfill adjacent to Den Lane (former Betley Ash Quarry) - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
<p>Soil, leachate, ground gas and groundwater contamination from historical landfill</p> <p>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</p>	On-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Occasional workers, and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
		Inhalation of ground gases and vapours	Unlikely	Medium	Low
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A Superficial Secondary B bedrock aquifer and unproductive strata	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 Entry into land drain to south of site	Unlikely	Minor	Very low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low
	Sensitive ecosystems - Betley Mere SSSI Midland Meres and Mosses Phase 1 Ramsar site	Lateral migration through groundwater Direct run-off from site Entry into land drain to south of site	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes remediation works required, 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 32: 5-45 brickfield refuse tip and 5-48 brickfield - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
<p>Soil, leachate, ground gas and groundwater contamination from historical landfill</p> <p>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</p>	On-site users Occasional farm 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 and vapours	Unlikely	Medium	Low
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial and bedrock aquifers	Leaching, vertical and lateral migration from contaminated soils and waters	Unlikely	Negligible	Very 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 and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low
	Sensitive ecosystems - Midland Meres and Mosses Phase 1 Ramsar site	Lateral migration through groundwater Surface water	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes remediation works required 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 33: 5-55 historical landfill at Gonsley Green Farm - 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 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 Occasional farm 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 and vapours	Unlikely	Medium	Low
	Off-site users Residential and 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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive bedrock and superficial deposits	Leaching, vertical and lateral migration from contaminated soils and waters	Unlikely	Negligible	Very 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 and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- assumes site remediation is not required 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 34: 5-65 and 5-110 railway infrastructure (WCML and Basford Sidings) - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from railway running line and siding operations Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, 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
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users Residential and 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 superficial aquifer and unproductive strata Secondary B bedrock aquifer and unproductive strata Groundwater abstraction Grange Farm	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)	Exposure of property to gases and vapours	Unlikely	Negligible	Very low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Sensitive ecosystems - Betley Mere SSSI Midland Meres and Mosses Phase 1 Ramsar sites	Groundwater migration Surface water migration	Unlikely	Medium	Low

Description

Notes/assumptions

- assumes remediation works required 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 35: 5-94 former petrol filling station (Hough Garage) and 5-234 operational petrol filling station (Crewe Arms Express) - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Free phase and dissolved phase hydrocarbons	On-site users Workers and members of the public	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 and vapours	Unlikely	Medium	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary B bedrock 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	Low likelihood	Minor	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- assumes site remediation is not required 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 36: 5-101 historical landfill site 160m south-west of Weston Hall - 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 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	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Occasional farm workers and recreational use	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
		Inhalation of ground gases and vapours	Unlikely	Medium	Low
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer Unproductive bedrock 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	Low likelihood	Medium	Moderate/low
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- assumes remediation works required 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.
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Table 37: 5-116 historical landfill at Yew Tree Farm - 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 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 Occasional farm workers and recreational use	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 and vapours	Unlikely	Medium	Low
	Off-site users Residential, farming and recreational use	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer Secondary A and Secondary B bedrock 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 /erosion from site	Unlikely	Medium	Low
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
Direct contact with contaminated soils and waters		Unlikely	Medium	Low	
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present	

Description

Notes/assumptions

- assumes site remediation is not required 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.
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Table 38: 5-107, 5-166, 5-168, 5-201, 5-207, 5-210, 5-213, 5-220, 5-222, 5-223, 5-249, 5-250 and 5-255 evidence of fuel storage Basford and Crewe areas- zone1 and zone 2 - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from historical and recent fuel spillages Potential for a range of petroleum hydrocarbons to be present	On-site users Workers	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
	Off-site users Residential and 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 Unproductive superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Minor	Moderate/low
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Medium	Moderate/low
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present	

Description

Notes/assumptions

- assumes remediation works required 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.
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Table 39: 5-177, 5-243, 5-244, 5-248, 5-252 railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone in Crewe/Basford area - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
<p>Soil, leachate, and groundwater contamination from railway running lines siding operations, rail engineering works, and other engineering works</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Low likelihood	Medium	Moderate/low
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Low likelihood	Medium	Moderate/low
	Off-site users	Direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Residential and agricultural workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Controlled waters - groundwater	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Secondary A superficial aquifer and unproductive strata				
	Secondary B bedrock aquifer				
	Controlled waters - surface water	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
Property receptors - buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Minor	Low	
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- assumes remediation works required 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.
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Table 40: 5-178, 5-182, 5-186, 5-203, 5-204, 5-205, 5-208, 5-245 and 253, railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
<p>Soil, leachate, and groundwater contamination from railway running lines siding operations, rail engineering works, and other engineering works</p> <p>Potential for a range of organic and inorganic contaminants including but not limited to hydrocarbons, including fuels and oils, solvents, paints/varnishes, creosote (containing PAH), PCBs, heavy metals, ethylene glycol, herbicides, ash and sulphate</p>	On-site users	Direct contact, ingestion of dusts and vapours from contaminated soils	Unlikely	Medium	Low
	Workers	Direct contact, ingestion, inhalation of vapours from contaminated waters	Unlikely	Medium	Low
	Off-site users Residential and 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 Unproductive superficial aquifer Secondary B 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	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Direct contact with contaminated soils and waters	Low likelihood	Minor	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not applicable

Description

Notes/assumptions

- assumes remediation works required 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.
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Table 41: 5-202 and 5-209 former iron and steel works - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Potential contaminants associated with iron and steel works include metals, asbestos, inorganic compounds such as sulphates, phosphates, sulphides, cyanides, thiocyanides and fluorides, acids and alkalis, hydrocarbons and coal tars if coking works were present	On-site users Workers and members of the public	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 and vapours	Unlikely	Medium	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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial aquifer Secondary B 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)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Unlikely	Negligible	Very low
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present	

Description

Notes/assumptions

- assumes site remediation is not required 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.
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Table 42: 5-227 former petrol filling station (Nantwich Road) - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Free phase and dissolved phase hydrocarbons	On-site users 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
		Inhalation of ground gases and vapours	Unlikely	Medium	Low
	Off-site users 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
		Inhalation of ground gases and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Unproductive superficial aquifer Secondary B 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)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
Direct contact with contaminated soils and waters		Unlikely	Medium	Low	

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- assumes site remediation is not required 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 43: 5-239 British Railways Tip - 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 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 Workers and recreational 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 and vapours	Unlikely	Medium	Low
	Off-site users Residential and 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 and vapours	Unlikely	Medium	Low
	Controlled waters - groundwater Secondary A superficial aquifer and unproductive strata Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Low likelihood	Severe	Moderate

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
		Direct contact with contaminated soils and waters	Unlikely	Medium	Low
	Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present

Description

Notes/assumptions

- assumes remediation works required 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.
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Table 44: 5-246 Train refuelling island, Crewe - post-construction CSM and qualitative risk assessment

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate, and groundwater contamination from historical and recent fuel spillages Potential for a range of petroleum hydrocarbons to be present	On-site users 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
	Off-site users 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 superficial aquifer Secondary B bedrock aquifer	Leaching, vertical and lateral migration from contaminated soils and waters	Likely	Medium	Moderate
	Controlled waters - surface water Surface water abstraction 800m east of site	Lateral migration through groundwater Direct run-off from site	Likely	Medium	Moderate
	Property receptors - buildings, foundations and services (off-site)	Exposure to explosive gases and vapours	Unlikely	Severe	Moderate/low
		Direct contact with contaminated soils and waters	Low likelihood	Minor	Low
Sensitive ecosystems - Not present	Not applicable	Not applicable	Not applicable	Not present	

Description

Notes/assumptions

- assumes site remediation is not required 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.
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3.4 Assessment of temporary (construction) and permanent (post-construction) effects

Table 45: 5-29 historical landfill adjacent to Den Lane (former Betley Ash Quarry) - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate	Moderate	Moderate/low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of Secondary A aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate	High	Low	Minor adverse effect	Moderate beneficial effect
Discharge of contaminants to surface water by lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Very low	Minor adverse effect	Minor beneficial effect
Exposure of property to gases and vapours	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure to sensitive ecosystems through lateral migration through groundwater, direct run-off from site and entry into land drain to south of site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Main risk	Moderate	High	Moderate/low		
Overall significance				Minor adverse to neutral effect	Neutral to moderate beneficial effect

Table 46: 5-45 brickfield Refuse Tip and 5-48 brickfield - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors to inhalation of gases and vapour	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors to inhalation of gases and vapours	Low	Low	Low	Neutral effect	Neutral effect
Exposure of unproductive strata to leaching, vertical and lateral migration from contaminated soils and waters	Very low	Low	Very 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	Very low	Minor adverse effect	Minor beneficial effect
Exposure of property to gases and vapours	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure to sensitive ecosystems through lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Main risk	Moderate/low	Moderate	Moderate/low		
Overall significance				Minor adverse to neutral effect	Neutral to minor beneficial effect

Table 47: 5-55 historical landfill at Gonsley Green Farm - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of unproductive strata to leaching, vertical and lateral migration from contaminated soils and waters	Very low	Low	Very 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 gases and vapours	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Main risk	Moderate/low	Moderate	Moderate/low		
Overall significance				Minor adverse to neutral effect	Neutral to minor beneficial effect

Table 48: 5-65 and 5-110 railway infrastructure (WCML and Basford Sidings) - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A 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	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Exposure of property to gases and vapours	Very low	Very low	Very low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Very low	Low	Very low	Minor adverse effect	Neutral effect
Exposure to sensitive ecosystems through lateral migration through groundwater and direct run-off from site	Low	Moderate/low	Low	Minor adverse effect	Neutral effect
Main risk	Moderate/low	Moderate	Moderate/low		
Overall significance				Minor adverse to neutral effect	Neutral effect

Table 49: 5-94 former petrol filling station (Hough Garage) and 5-234 operational petrol filling station (Crewe Arms Express) - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of Secondary A aquifer to leaching, vertical and lateral migration from contaminated soils and waters	Moderate	High	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	Low	Low	Low	Neutral effect	Neutral effect
Exposure of property to gases and vapours	Moderate	Moderate	Moderate/low	Neutral effect	Minor beneficial effect
Direct contact of property with contaminated soils and waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Main risk	Moderate	High	Moderate/low		
Overall significance				Minor adverse to neutral effect	Neutral to minor beneficial effect

Table 50: 5-101 historical landfill site 160m south-west of Weston Hall - significance of effect assessment

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

Table 51: 5-116 historical landfill at Yew Tree Farm - significance of effect assessment

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

Table 52: 5-107, 5-166, 5-168, 5-201, 5-207, 5-210, 5-213, 5-220, 5-222, 5-223, 5-249, 5-250 and 5-255 fuel storage in zone 1 and zone 2 in Basford/Crewe areas - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors 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 by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary B 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	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Exposure of property to gases and vapours	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Low	Moderate/low	Moderate/low	Minor adverse effect	Minor adverse effect
Main risk	Moderate	Moderate	Moderate		
Overall significance				Minor adverse to neutral effect	Minor adverse to neutral effect

Table 53: 5-177, 5-243, 5-244, 5-248, 5-252 railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate	Moderate/low	Minor adverse effect	Neutral effect
Exposure of off-site human receptors 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 by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A 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	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Low	Low	Low	Neutral effect	Neutral effect
Main risk	Moderate	High	Moderate		
Overall significance				Minor adverse to neutral effect	Neutral effect

Table 54: 5-178, 5-182, 5-186, 5-203, 5-204, 5-205, 5-208, 5-245 and 253, railway infrastructure / engineering facilities and other engineering facilities in zone 1 and zone 2 in Crewe/Basford area - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of vapours from contaminated waters	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of off-site human receptors 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 by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary B 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	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Low	Low	Low	Neutral effect	Neutral effect
Main risk	Moderate	Moderate	Moderate		
Overall significance				Minor adverse to neutral effect	Neutral to minor beneficial effect

Table 55: 5-202 and 5-209 former iron and steel works - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors by direct contact and ingestion of contaminated waters	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Exposure of on-site human receptors to inhalation of gases and vapours	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors by direct contact and ingestion of contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors to inhalation of gases and vapours	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary B 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	Low	Very low	Minor adverse effect	Neutral effect
Exposure of property to gases and vapours	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Very low	Very low	Very low	Neutral effect	Neutral effect
Main risk	Moderate/low	Moderate/low	Moderate/low		
Overall significance				Minor adverse effect to neutral effect	Neutral effect

Table 56: 5-227 former petrol filling station (Nantwich Road) - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of Secondary B 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
Exposure of property to gases and vapours	Moderate	Moderate	Moderate /low	Neutral effect	Minor beneficial effect
Direct contact of property with contaminated soils and waters	Moderate /low	Moderate /low	Low	Neutral effect	Minor beneficial effect
Main risk	Moderate	Moderate	Moderate/low		
Overall significance				Neutral to minor adverse effect	Neutral to minor beneficial effect

Table 57: 5-239 British Railways Tip - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of on-site human receptors to inhalation of gases and vapours	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Exposure of off-site human receptors to contamination by direct contact, ingestion and inhalation of dusts and vapours from contaminated soils	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors by direct contact, ingestion and inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of off-site human receptors to inhalation of gases and vapours	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A 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	Moderate	Moderate	Neutral effect	Neutral effect
Exposure of property to gases and vapours	Moderate	Moderate	Moderate	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Moderate/low	Moderate/low	Low	Neutral effect	Minor beneficial effect
Main risk	Moderate	High	Moderate		
Overall significance				Minor adverse to neutral effect	Neutral to minor beneficial effect

Table 58: 5-246 Train refuelling island, Crewe - significance of effect assessment

Contaminant linkage	Baseline risk	Construction risk	Post-construction risk	Construction significance	Post-construction significance
Exposure of on-site human receptors to contamination by direct contact, ingestion, inhalation of dusts and vapours from contaminated soils	Moderate/low	Moderate	Low	Minor adverse effect	Minor beneficial effect
Exposure of on-site human receptors 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 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 by direct contact, ingestion, inhalation of vapours from contaminated waters	Low	Low	Low	Neutral effect	Neutral effect
Exposure of Secondary A 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	Moderate	Moderate	Neutral effect	Neutral effect
Exposure of property to gases and vapours	Moderate/low	Moderate/low	Moderate/low	Neutral effect	Neutral effect
Direct contact of property with contaminated soils and waters	Low	Low	Low	Neutral effect	Neutral effect
Main risk	Moderate	High	Moderate		
Overall significance				Minor adverse to neutral effect	Neutral to minor beneficial 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 South Cheshire 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
 - lists of marl pits in each study area.
- 5.1.2 The remainder of this appendix presents this data for relevant sites.
- 5.1.3 The Proposed Scheme does not cross any mineral safeguarding areas (MSA) within the Cheshire Replacement Minerals Local Plan (1999)³. CEC is in the process of reviewing the Minerals Local Plan and has identified a proposed MSA for sand and gravel encompassing much of the route of the Proposed Scheme from the southern end of the study area to the A500 Shavington Bypass, together with an area along Valley Brook in Crewe. The entirety of the route of the Proposed Scheme within the South Cheshire area is also identified as a proposed MSA for salt. Based on the data presented on the CEC website, there are no current mineral extraction operations within the study area.
- 5.1.4 Data provided on the UK Oil and Gas Authority website indicates the following:
- the portion of the South Cheshire area from Chorlton village northwards is covered by petroleum Block SJ75. Data provided on the UK Oil and Gas Authority website indicates that Block SJ75 has been awarded to Ineos Upstream Limited under Petroleum Exploration and Production Licence reference PEDL293;
 - an onshore conventional oil and gas borehole, drilled for Hamilton Oil Company Ltd, located approximately 160m north of the point where Den Lane crosses the WCML. The borehole was drilled in 1992, and was subsequently plugged and abandoned; and
 - the entire South Cheshire study area is located within the Bowland Shale Gas Study Area. The data also indicates that north of Den Lane; the remainder of the South Cheshire area is located within the Bowland Shale Prospective Area.
- 5.1.5 There are no identified active or historical marl pits in the study area.

³ Cheshire County Council, (1999), *The Cheshire Replacement Minerals Local Plan*

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