

**LAND ADJOINING 23 JAGGER LANE, EMLEY MOOR, HUDDERSFIELD, WEST YORKSHIRE, HD8 9SY - CONCEPTUAL SITE MODEL FOR PROPOSED RESIDENTIAL DEVELOPMENT**

Sources (Historic & Current)	Pathways	Receptors	Viable Linkage	Risk	Comments/ Remedial Measures
<b>On-site:</b> Soil contamination from TPHs from former diesel tank: TP6 – 7600mg/kg at 0.25-0.35m Decreasing in concentration with depth TP6 – 88 mg/kg at 0.75-0.80m TP6 – 360mg/kg at 1.55-1.60m	Migration to and within shallow groundwater, Ingress of soil vapours and gases, Volatilisation of contaminants to indoor or outdoor air, Ingestion and direct human contact with soil, dust, vapours and gas Defective drainage, Service pipes.	Construction workers	✓	Low-Moderate	PPE to be provided to construction workers and good site hygiene practices to be observed.
		Site occupants	✓	Low-Moderate	TP6 to be targeted for remedial treatment by excavation and removal to a depth of 0.6m.
		Shallow groundwater in Secondary A Aquifer	✓	Low-Moderate	
		Neighbouring residential properties and occupants	✓	Low	
		Building structures	x	-	
		On-site drinking water supply pipes	✓	Low-Moderate	A risk assessment for drinking water supply pipes <sup>1</sup> has shown that protective measures are required in the selection of water supply pipes for the site unless the contamination is remediated and the remediation validated.
Soil contamination from PAHs predominantly relating to areas of old tarmac hardstanding and compacted road scalplings within the top 0.30m including benzo(a)pyrene: TP2 – 17mg/kg at 0.15-0.25m TP3 – 7.1mg/kg at 0.05-0.15m TP4 – 19mg/kg at 0.15-0.27m TP4 – 6mg/kg at 0.79m TP5 – 7.5mg/kg at 0.3m	Migration to and within shallow groundwater, Volatilisation of contaminants to indoor or outdoor air, Ingestion and direct human contact with soil, dust, vapours and gas.	Construction workers	✓	Low-Moderate	PPE to be provided to construction workers and good site hygiene practices to be observed
		Site occupants	✓	Low-Moderate	PAHs to be removed from site during the excavation and removal of the old areas of hardstanding (tarmac and compacted road scalplings) to 0.35m
		Shallow groundwater in Secondary A Aquifer	✓	Low	The benzo(a)pyrene in soil is non-leachable.
		Neighbouring residential properties and occupants	✓	Low	
		Building structures	x	-	
		On-site drinking water supply pipes	✓	Low	
Soil contamination from arsenic TP2 – 49mg/kg at 0.15-0.25m TP3 – 240mg/kg at 0.05-0.15m TP3 – 77mg/kg at 0.60-0.70m TP4 – 46mg/kg at 0.15-0.27m TP4 – 39mg/kg at 0.79m	Migration to and within shallow groundwater, Volatilisation of contaminants to indoor or outdoor air, Ingestion and direct human contact with soil, dust, vapours and gas.	Construction workers	✓	Low-Moderate	PPE to be provided to construction workers and good site hygiene practices to be observed.
		Site occupants	✓	Low-Moderate	TP3 to be targeted for remedial treatment by excavation and removal to a depth of 0.75m. TP2 and TP4 concentrations to 0.27m to be removed with old surfacing.
		Shallow groundwater in Secondary A Aquifer	✓	Low	The arsenic in soil has a low leachability.
		Neighbouring residential properties and occupants	✓	Low	
		Building structures	x	-	
		On-site drinking water supply pipes	✓	Low	
Soil contamination from lead TP1 – 270mg/kg at 0.25-0.35m TP2 – 260mg/kg at 0.15-0.25m TP3 – 590mg/kg at 0.05-0.15m TP3 – 390mg/kg at 0.60-0.70m	Migration to and within shallow groundwater, Volatilisation of contaminants to indoor or outdoor air, Ingestion and direct human contact with soil, dust, vapours and gas, Defective drainage.	Construction workers	✓	Low-Moderate	PPE to be provided to construction workers and good site hygiene practices to be observed.
		Site occupants	✓	Low-Moderate	TP1 to be targeted for remedial treatment by excavation and removal to a depth of 0.40m and TP3 to 0.75m. TP2 concentration to be removed with old surfacing.
		Shallow groundwater in Secondary A Aquifer	✓	Low-Moderate	The lead in soil at TP1 is potentially leachable.
		Neighbouring residential properties and occupants	✓	Low	
		Building structures	x	-	
		On-site drinking water supply pipes	✓	Low	
Elevated concentrations in sulphate: TP3 - 2200mg/kg at 0.6-0.7m TP4 - 2800mg/kg at 0.15-0.27m	Migration to and within shallow groundwater, Volatilisation of contaminants to indoor or outdoor air, Ingestion and direct human contact with soil, dust, vapours and gas, Defective drainage, Service pipes.	Construction workers	✓	Low	PPE to be provided to construction workers and good site hygiene practices to be observed.
		Site occupants	✓	Low	
		Shallow groundwater in Secondary A Aquifer	✓	Low	
		Neighbouring residential properties and occupants	✓	Low	
		Building structures	✓	Low-Moderate	Use of sulphate resistant cement to be considered in construction.
		On-site drinking water supply pipes	x	-	
Asbestos containing materials:- Corrugated asbestos cement sheet roofing and cladding to the large shed, stockpile of similar adjoining and other potential asbestos containing materials within the fabric of the buildings	Ingestion and direct human contact with building elements, Dust / wind during dismantling of roof.	Demolition contractors (roof dismantling)	✓	Moderate	The main risks are to demolition contractors and construction workers (who will need to be provided with the appropriate PPE) and neighbouring residents during dismantling / removal of the corrugated asbestos cement sheeting. A refurbishment / demolition asbestos survey is advised to comply with the control of Asbestos Regulations 2012 and the double bagging, labelling and appropriate off-site disposal of any asbestos materials encountered during excavations must be managed in accordance with Waste Regulations.
		Construction workers (ground workers)	✓	Low	
		Site occupants	✓	Low	
		Shallow groundwater in Secondary A Aquifer	x	-	
		Neighbouring residential properties and occupants	✓	Low-Moderate	
		Building structures	x	-	
		On-site drinking water supply pipes	x	-	
<b>Off-Site:</b> Agricultural land, Pre 1961 colliery and associated small tip (35m SW), Historical landfill (385m NW)	Migration via shallow groundwater, Migration to deep groundwater, Volatilisation of contaminants to indoor or outdoor air, Ingestion and direct human contact with soil, water, dust, vapours & gas Defective drainage, Service pipes.	Construction workers	✓	Low	Potential off site sources of contamination are considered to present a low risk to on-site receptors.
		Site occupants	✓	Low	
		Shallow groundwater in Secondary A Aquifer	✓	Low	
		Neighbouring residential properties and occupants	✓	Low	
		Building structures	x	-	
		On-site drinking water supply pipes	✓	Low	

1. Pipe selection risk assessment under the protocols published by agreement between Water UK and the Home Builders Federation in January 2014  
Level of risk assessed in accordance with Ciria Report C552  
Shaded areas represent linkages involving offsite sources which do not relate to the site