

TRANSPORT AND WORKS ACT 1992

Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006

THE NETWORK RAIL (STALYBRIDGE TO DIGGLE (SADDLEWORTH) ENHANCEMENTS) ORDER

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APPENDIX 11A – BASELINE REPORTS OF THE ORDER SCHEME

1. BASELINE FOR PRINTWORKS SITE COMPOUND

1.1 Site history

Table 1-1 provides a summary of the historical development at the Printworks site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250m area has been determined principally by reference to historical maps obtained from Groundsure¹.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 1-1 – Printworks site compound - Summary of historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1923	0 m	on-site
Tramway	1910-1933	1 m	west
Tank or Trough	1863	3 m	east
Railway building	1899-1938	21 m	south-east
Riverside Mills (cotton)	1893-1933	23 m	south-east
Box factory	1966-1995	23 m	south-east
Tank or Trough	1863	33 m	south-east
Unspecified heap	1906-1954	34 m	east
Tanks	1863-1985	44 m	south-east
Tunnel	1899-1995	78 m	south
River Meadow Mills (cotton)	1863-1933	80 m	east
Unspecified ground workings	1923	86 m	south-east

¹ Groundsure 2024, Enviro + Geo Insight (GS-J63-YFR-PCH-GFU)

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified heap	1906-1954	86 m	south-east
Unspecified ground workings	1954	96 m	north-east
Electricity works	1965-1966	98 m	north-east
Tanks	1993	114 m	east
Tank or Trough	1863	135 m	south-west
Scrap yard	1995	136 m	south-east
Cuttings	1906-1923	162 m	north-east
Unspecified tank	1965-1991	171 m	east
Tank or Trough	1863	172 m	north
Unspecified ground workings	1899-1995	179 m	south-west
North end mills (cotton)	1899-1938	179 m	east
Higher Glent Quarry	1845-1977	179 m	west
Railway sidings	1933-1954	194 m	west
Unspecified heap	1933	195 m	south-west
Refuse heap	1906-1981	198 m	south-east
Unspecified tank	1898	206 m	south
Unspecified tank	1898-1991	215 m	south-west
Electricity substation	1991-1993	216 m	south-east
Tank or Trough	1863	219 m	south
Unspecified quarry	1845-1977	219 m	south-west
Unspecified heap	1906-1954	222 m	north-east
Unspecified tank	1893	227 m	south-west
Unspecified quarry	1845-1977	240 m	west

1.2 Previous ground investigations

Description of the investigation

An intrusive ground investigation was undertaken by Bam Ritchies in December 2019² around the Stalybridge Tunnel, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Two of the locations

² Bam Ritchies, 2020. TransPennine Route Upgrade GI - Ground investigation report - factual account (151667-TSA-W2A-MVL3-DM3-X-MF-701233)

are within 250 m of the site and have been summarised in Table 1-2 and the investigation locations are displayed in Figure 1-1.

Table 1-2 – Printworks site compound - Summary of investigations

Item	No. undertaken
Number of boreholes	Two
Number of trial pits	None
PID* testing undertaken	None
Number of soil samples tested	None
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	



Figure 1-1 – Printworks site compound - Previous investigations

Ground conditions

Table 1-3 summarises the ground conditions encountered during the ground investigation.

Table 1-3 – Printworks site compound - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	<p>Grey and pink angular gravel of granite (Clean ballast)</p> <p>Dark brown and grey gravel of granite and basalt (Dirty ballast)</p> <p>Brownish grey and pink gravel of granite (Clean ballast)</p> <p>Brown clayey sandy gravel of granite and basalt (Very dirty ballast (non-cohesive)).</p>	0.25 - 0.26 (boreholes begin below rail line).	0.45 – 0.60
Pennine Upper Coal Measures Formation	<p>Weak grey sandstone</p> <p>Medium strong, locally weak thinly laminated locally cross bedded grey and dark grey mudstone with frequent sandstone laminae.</p> <p>Medium strong grey mudstone</p> <p>Strong thinly to thickly laminated light grey and grey fine-grained sandstone with frequent thin mudstone interlaminar. Partially weathered. Frequent convolute and cross bedding.</p> <p>Medium strong very thinly to thinly laminated dark grey and grey mudstone with occasional thinly to thickly interlaminated fine-grained sandstone. Partially to distinctly weathered.</p>	0.45 – 0.60	5.00 - 5.50

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs.

1.3 Published geology

A summary of the published geology relevant to the Printworks Site Compound is provided below. The data has been sourced from Groundsure¹ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground may be present on-site. The Made Ground feature extends off-site to the east. There is also a potential Made Ground feature on the north-west boundary. The south-west of the site is not indicated to be underlain by Made Ground.

Superficial deposits

The 1:10,000 scale published geology maps indicate Head deposits to be present across the majority of the site. Alluvium is located 24 m south-east, and Devensian Till is located 240 m south-east. The south-west of the site is not underlain by superficial deposits on BGS mapping.

Bedrock

The 1:10,000 scale published geology indicates there are four bedrock geology designations on the site. There are three other bedrock geology designations within 250 m of the site.

A summary of the bedrock geology encountered on-site and within 250 m of the site boundary is provided in Table 1-4. Figure 1-2 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 1-4 – Printworks site compound - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional Details
Huddersfield White Rock	0 m	on-site	Sandstone
Marsden Formation	0 m	on-site	Mudstone and siltstone
Rossendale Formation	0 m	on-site	Mudstone and siltstone
Rough Rock Flags	0 m	on-site	Sandstone

³ BGS GeoIndex, 2020. https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.180598240.639117090.1725538202-1441530858.1725538201

Rossendale Formation	5 m	north-west	Mudstone and siltstone
Marsden Formation	17 m 43 m	east south-east	Mudstone and siltstone
Rough Rock	67 m	west	Sandstone
Pennine Lower Coal Measures Formation	123 m	west	Mudstone, siltstone and sandstone
Woodhead Hill Rock	154 m	west	Sandstone

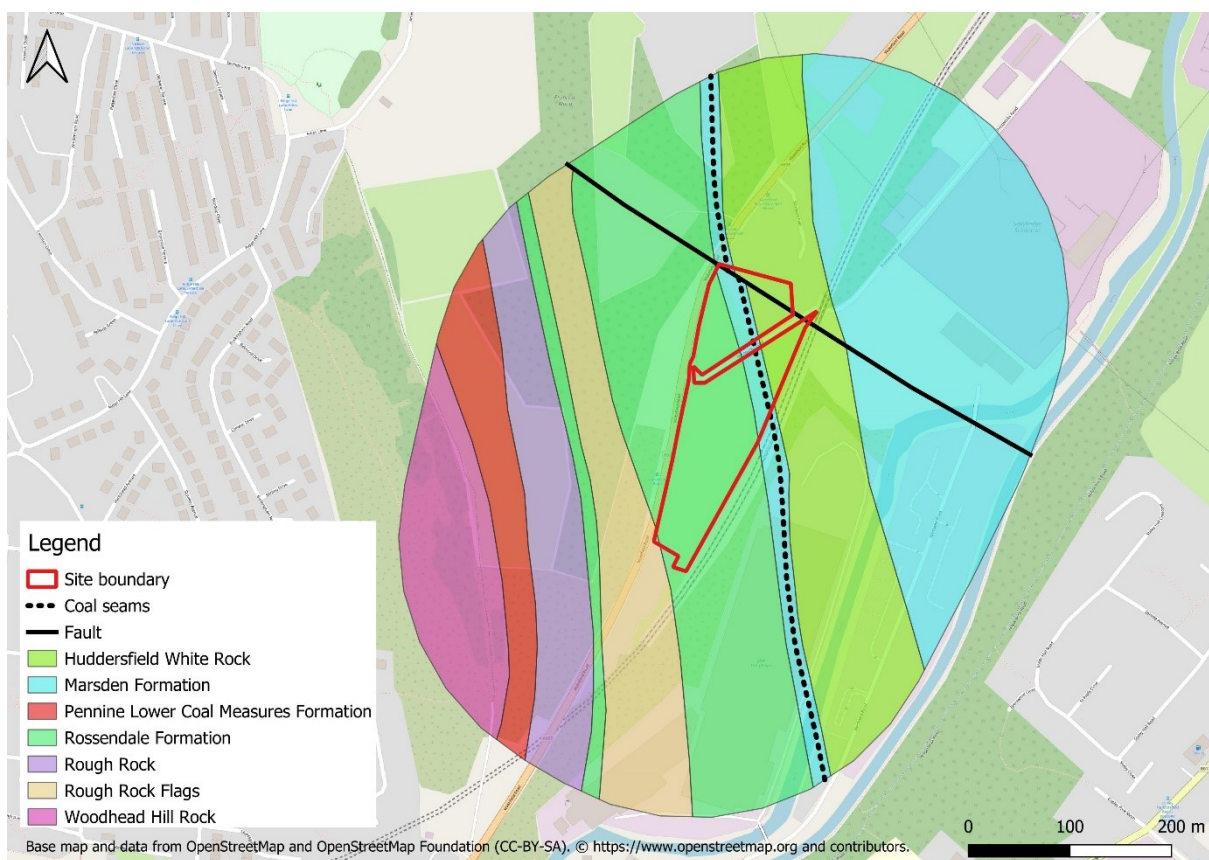


Figure 1-2 – Printworks site compound - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is one bedrock fault on the site and one other linear feature within 250 m of the site. Details are provided in Table 1-5 and faults are visible in Figure 1-2.

Table 1-5 – Printworks site compound - Faults and linear features

Category	Description	Orientation	Distance from the site boundary	Direction from the site boundary
Rock	Coal seam	north to south	0 m	on-site
Fault	Normal fault	north-west to south-east	0 m	on-site
Fossil horizon	Fossil horizon, marine band coincident with bedrock geology boundary	north to south	0 m	on-site
Fossil horizon	Fossil horizon, marine band coincident with bedrock geology boundary	north to south	91 m	north

1.4 Hydrogeology

Superficial aquifers

The data from Groundsure¹ indicates that there are no designated superficial aquifers on-site. A secondary A aquifer is located 20 m south of the site. A secondary (Undifferentiated) aquifer is recorded 211 m south-east of the site.

The Environment Agency describes a secondary A aquifer as “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

A secondary (Undifferentiated) aquifer is described as “Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.”

Bedrock aquifers

The data from Groundsure¹ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure¹ data indicates that the groundwater vulnerability is medium for the bedrock aquifer on-site and off-site. Medium vulnerability indicates that the groundwater is an intermediate between high (areas easily able to

transmit pollution to groundwater) and low (areas that provide the greatest protection from pollution).

Groundwater source protection zones

The data from Groundsure¹ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹ indicates that there is one groundwater abstraction licence within 250 m of the site. This active licence is located 202 m south of the site, extracting for boiler feed and process water, operated by John Hargreaves (Collyhurst & Stalybridge) Ltd.

Groundwater discharge consents

The data from Groundsure¹ indicates there are no licensed discharge consents to groundwater on-site or within 250 m of the site.

1.5 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹ as an unnamed watercourse, which is located on-site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site have been provided in Table 1-6.

Table 1-6 – Printworks site compound - Surface watercourses

⁴ Defra. Multi-Agency Geographic Information for the Countryside (MAGIC) <https://magic.defra.gov.uk/>

Name of watercourse	Flow direction	Type	Distance from site	Direction from site	WFD overall classification
Unnamed watercourse	Unknown	On ground surface watercourse	0 m	on-site	-
River Tame (Chew Brook to Swineshaw Brook)	South	River	126 m	south-east	Moderate
Huddersfield Narrow Canal west section	n/a	Canal	242 m	south-east	Moderate

Surface water discharge consents

The data from Groundsure¹ indicates there are no licensed discharge to surface water features on-site. There is one licensed discharge to surface water feature within 250 m of the site, details of which have been provided in Table 1-7. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 1-7 – Printworks site compound – Surface water discharge consents

Permit number	Address	Effluent type	Receiving water	Distance from site	Direction from site	Effective date
01TAM0125	Copley St, Stalybridge, Tameside, Greater Manchester	Sewage discharges – sewer storm overflow – water company	River Tame	215 m	east	01/01/1995, revoked 02/09/2010 03/09/2010, revoked 12/04/2016

Surface water abstractions

The data from Groundsure¹ indicates there is one historical surface water abstraction within 250 m of the site. This was located 121 m east of the site and related to boiler feed and process water from 18/06/1996, with no expiry data available from Groundsure.

1.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

1.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 1-8.

Table 1-8 – Printworks site compound - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	Published geology records two coal seams within 250 m of the site.
Coal mining areas	The site is located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. There are no other non-coal mining areas within 250 m of the site.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There is one brit pit within 250 m of the site. This is located 221 m west. It is a surface mineral working, for sandstone, but at date of entry, has ceased to extract minerals.
Surface ground workings	There is one surface ground workings feature on-site. There are 10 other surface ground workings features within 250 m of the site. Details are provided in Table 1-9.
Underground workings	There are no underground workings on-site. There is one other underground workings within 250 m of the site. Details are provided in Table 1-9.
Historical mineral planning areas	There are no historical mineral planning areas on-site. There is one historical mineral planning area within 250 m of the site, located 222 m west. This is associated with the surface mining of sandstone.

⁵ UKHSA, UK Radon Map <https://www.ukradon.org/information/ukmaps>

Table 1-9 provides further detail on surface ground workings and the relative distance from the site boundary.

Table 1-9 – Printworks site compound - Mineral exploitation

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1923
Unspecified heap	34 m	east	1906-1954
Tunnel	78 m	south	1899-1995
Unspecified ground workings	86 m	south-east	1906-1954
Unspecified ground workings	96 m	north-east	1954
Cuttings	162 m	north-east	1906-1923
Unspecified ground workings	179 m	south-west	1899-1995
Unspecified quarry	188 m	west	1899-1977
Refuse heap	198 m	south-east	1906-1981
Higher Glent quarry	221 m	west	1845-1954
Unspecified heap	224 m	north-east	1906-1954
Canal	236 m	south-east	1899-1995

The Mining Remediation Authority viewer⁶ indicates that the site is within a Coal Authority high risk development area. A Coal Authority Consultants Coal Mining Report has been obtained for the site and indicates:

- no records of past underground mining activity;
- no probably unrecorded shallow workings;
- no mine entries within 100 m of the site;
- no future coal mining plans; and
- one workable coal outcrop within the site boundary, however no information on depth is provided.

Historical and current landfills and waste management facilities

⁶ The Mining Remediation Authority viewer 2023. <https://datamine-cauk.hub.arcgis.com/>

The data from Groundsure¹ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 1-10.

Table 1-10 – Printworks site compound - Landfill and waste summary

Category	Site name or address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
Historical landfill	Glent Quarry	Inert, industrial, commercial, household, liquid sludge	172 m	west	01/01/1974	Last recorded: 31/03/1979
Historical waste sites	-	Scrap Yard	135 m	south-east	-	-
	-	Breaker's Yard	193 m	east	-	-
	69 Northend Road, Stalybridge, Greater Manchester, SK15 3AZ	Waste transfer station	199 m	south-east	-	-
	Former River Meadow Mill, North End Road, Stalybridge, Greater Manchester, SK15 3AZ	Waste transfer station.	208 m	south-east	-	-
Licensed waste sites	Former River Meadows Mills, Northend Road, Stalybridge, Cheshire, SK15 3AZ	Special waste transfer station	110 m	east	03/10/2005	Issued
	69, Northend Road, Stalybridge, Cheshire, SK15 3AZ	Physical treatment facility	180 m	south-east	26/08/2005	Issued and modified
		Metal recycling	186 m			

Category	Site name or address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
		site (vehicle dismantler)	186 m			
		Metal recycling site (vehicle dismantler)				
	Land/premises at, Northend Road, Mottram, Stalybridge, Cheshire, SK15 3AZ	Metal recycling site (vehicle dismantler)	203 m	south-east	28/05/2004	Revoked
	69, Northend Road, Stalybridge, Cheshire, SK15 3AZ	Physical treatment facility	210 m	south-east	08/05/2002	Expired
	69, Northend Road, Stalybridge, Cheshire, SK15 3AZ	Special waste transfer station	225 m	south-east	20/10/1997	Expired
Waste exemptions	Smurfit Kappa, Knowl St, Stalybridge, SK15 3AR	Use of waste for a specified purpose	155 m	south	-	-

1.8 Unexploded bombs (UXB)

According to freely available online risk maps⁷, there is a low risk of UXB on the site.

1.9 Sensitive land use

⁷ Zetica, Unexploded Bomb Risk Map and Pre-Desk Study, <https://zeticauxo.com/downloads-and-resources/risk-maps/>

The data from Groundsure¹ indicates that a site of special scientific interest (SSSI), associated with the Huddersfield Narrow Canal, is located 239 m south-east of the site. The site is located within a SSSI impact zone. There are no other sensitive land uses including Ramsar or areas of conservation within 250 m of the site.

1.10 Regulatory information

Regulated activities within 250 m of the Order Scheme boundary could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are five pollution incidents reported by Groundsure¹ within 250 m of the site and a summary has been provided in Table 1-11.

Table 1-11 – Printworks site compound - Pollution incidents

Pollutant	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Atmospheric Pollutants and Effects	181 m	south-east	Category 3 (minor)	Category 3 (minor)	Category 3 (minor)	08/12/2001
Atmospheric Pollutants and Effects: Contaminated Water						
Oils and fuel	187 m	south-east	Category 3 (minor)	Category 3 (minor)	Category 4 (no impact)	06/02/2003
Atmospheric pollutants and effects: contaminated water	191 m	south-east	Category 2 (significant)	Category 3 (minor)	Category 3 (minor)	17/11/2004
Specific waste materials	199 m	east	Category 4 (no impact)	Category 3 (minor)	Category 4 (no impact)	23/11/2001
Specific waste materials	235 m	south-east	Category 4 (no impact)	Category 3 (minor)	Category 4 (no impact)	14/02/2002

Pollution prevention and controls

The data from Groundsure¹ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications, including pollution prevention substances, licensed pollutant release, historical and current licensed industrial activities, within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure¹ indicates there are no Control of Major Accident Hazards (COMAH) sites or planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹ indicates there are no recent industrial land uses on-site. There are 18 recent land uses within 250 m of the site. A summary has been provided in Table 1-12.

Table 1-12 – Printworks site compound - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
Mast	Infrastructure and facilities	Telecommunications features	25 m	south-east
Electricity substation	Infrastructure and facilities	Electrical features	43 m	south-east
Factory	Industrial features	Unspecified works or factories	114 m	south-east
Tank	Industrial features	Tanks (generic)	119 m	east
Smurfit Kappa Stalybridge	Industrial products	Packaging	150 m	south-east
Electricity substation	Infrastructure and facilities	Electrical features	176 m	north-east
Electricity substation	Infrastructure and facilities	Electrical features	180 m	south-east
Electricity substation	Infrastructure and facilities	Electrical features	203 m	south
Recycling business	Infrastructure and facilities	Recycling centres	206 m	south-east

Site	Industrial land use category	Description	Distance from site	Direction from site
Electricity substation	Infrastructure and facilities	Electrical features	219 m	south-east
Sims Lifecycle Services	Recycling services	Recycling, reclamation and disposal	222 m	south-east
Tank	Industrial features	Tanks (generic)	225 m	south-west
John Hargreaves Collyhurst & Stalybridge Ltd	Industrial products	Wood products including charcoal, paper, card and board	228 m	south
Electricity substation	Infrastructure and facilities	Electrical features	229 m	south-east
Bridge Louvre Company Ltd	Industrial products	Cooling and refrigeration	231 m	south-east
Factory	Industrial features	Unspecified works or factories	237 m	south-east
Electricity substation	Infrastructure and facilities	Electrical features	238 m	south-east
Park Garage	Repair and servicing	Vehicle repair, testing and servicing	245 m	south-east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure¹.

Contaminated land designations

According to Groundsure¹, there are no sites designated as contaminated land under Part 2A of the Environment Protection Act 1990 on-site or within 250 m of the site.

1.11 Site area reconnaissance

A site walkover was undertaken on 17 August 2024 by two AtkinsRéalis environmental consultants. The site walkover was completed prior to the alterations to the Order Scheme boundary; therefore, the northern parcel

was not included. A summary of the observations made during the visit is provided in Table 1-13.

Table 1-13 – Printworks site compound - Site walkover record

Item	Description
Location	<p>The site is located on Third Party land north of Stalybridge, Greater Manchester. The site is off-track with national grid reference SJ 96842 99216 and What3Words of hang.moods.switch.</p> <p>The site is accessed via a locked metal gate approximately 1.2 m tall by 3.5 m wide, off Printworks Road. The compound covers an area of 1.46 hectares (Ha) which slopes sharply towards the railway to the east. Printworks Road bounds the compound to the north, the railway to the east, a private residence and garden to the south and Wakefield Road to the west of the compound.</p>
Description of current use/ activities	The site comprises a vegetated grazing field.
Fuel/chemical storage	No evidence of fuel storage was observed.
Evidence of land contamination	No evidence of land contamination was observed.
Invasive Species	Himalayan Balsam was observed in several areas adjacent to the railway.
Surface coverage	<p>The site comprises entirely of vegetation cover (95% grass, 5% trees and shrubbery). Mature trees are sporadically present, often isolated, through the site.</p> <p>The whole site slopes from approximately west to east. Printworks Road slopes down relative to the site, from approximately level with the site at the junction with Wakefield Road to 2-3 m below the site level at the viaduct/underpass. The railway to the east of site is approximately level with the site in the north, and approximately 2 m above the site level in the south.</p>
Boundary Types	<p>The entrance to the field has an outer gate, a pen approximately 3.5 m by 3.5 m with tall grass, and another metal gate giving access to the main field. A heras panel is on the east side of the pen.</p> <p>A barbed wire fence, approximately 1 m tall with regularly spaced wood posts (occasionally metal posts on the railway boundary) surrounds the site on all sides. A stone wall is present outside of the fence on the</p>

Item	Description
	north and west boundaries. Shrubbery/hedges have formed along the embankment on the southern half of the railway boundary.
	A residential property and associated garden are adjacent to the southern boundary of the site.
Surface Water Features	Evidence of a shallow stream/spring can be observed in the centre of the site, flowing approximately east downslope towards the railway. An area of water-logged ground is evident at the base of the slope in the centre of the site.

1.12 Initial conceptual site model

Through a review of historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of the existing land use and future use of the site as a construction compound. It is assumed the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground identified on published geological mapping; and
 - Coal seam identified underlying the site.
- Off-site:

- Historical features surrounding the site including:
 - Cotton mills;
 - Tanks;
 - Unspecified factories, heaps, mills and ground workings;
 - Electricity works;
 - Scrap yard;
 - Riverside Mills; and
 - Higher Glent Quarry.
- Current features surrounding the site including:
 - Electricity substations;
 - Factory;
 - Tanks; and
 - Recycling businesses.
- Historical landfill:
 - Former River Meadows Mills;
 - Glent Quarry; and
 - Northend Road.

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate and ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi-volatile organic compounds (VOCs/SVOCs); and
- ground, landfill and mine gases.

Potential receptors

The following receptors have been identified at the site based on an open space end use:

Human Health

- On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
- Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of open space areas.

Controlled Waters

- Groundwater:
 - Secondary A bedrock aquifer
- Surface water:
 - Unnamed watercourse;
 - River Tame; and
 - Huddersfield Narrow Canal west section.

Property and Services

- On-site: construction compound buildings (offices, welfare, canteen, stores, etc.);
- Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

Human Health

- inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
- ingestion of contaminated soils, soil-derived dust and groundwater;
- dermal contact with soil, soil-derived dust and groundwater; and
- inhalation of organic vapours (e.g. from fuel spills) and ground, landfill and mine gas.

Controlled Waters

- leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
- lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
- migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
- surface water run-off.

Property and Services

- ground gas migration and build up within confined spaces; and
- potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁸ which requires that potential risks to human health and the environment from construction activities are

⁸ HSE, The Construction (Design and Management) Regulations 2015

appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 1-14 – Printworks site compound - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Made Ground identified from published geology maps Coal seams identified from published mapping Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen)</i>	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future site users <u>Property –</u> <u>Compound related facilities</u> <u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, users of public open spaces.	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site. During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. Significant excavation plans have been noted in order to create the hardstanding for the compound. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses in the north/northwest area of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Property and Services –</u> <u>Commercial businesses and residential properties</u>	Low	Medium	Moderate/low risk Made Ground is present on the site, which may be a source of ground gas. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. Welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<i>sulphide or carbon monoxide)</i>	Inhalation of asbestos fibres.		Unlikely	Severe	<p>Moderate/low risk</p> <p>No previous developments on the site therefore likelihood of asbestos being present is low.</p> <p>The majority of the site, while in use as a compound, will be covered in hardstanding or gravel therefore it is unlikely that contact with the Made Ground or infilled ground will occur.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible. Once the construction of the temporary Order Scheme compound has been completed, hardstanding, stone and vegetation are likely to cover the site minimising the risk of wind entrainment of dust.</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater</u> <u>Controlled</u> <u>Waters</u> – Bedrock secondary A aquifer	Low	Medium	<p>Moderate/low risk</p> <p>Superficial deposits comprising of Head, are mapped across the majority of the site consisting of clay, silt, sand and gravel. The south-west of the site is indicated to not be underlain by any superficial deposits.</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					leachate by rainwater. Depending on the composition of the Head deposits encountered at the site (percentage of cohesive material), the superficial deposits may limit the vertical migration of contaminants. However, in the south-west of the site, Made Ground is likely to directly lie atop of bedrock. If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – River Tame Huddersfield Narrow Canal west section Unnamed watercourses	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is unlikely that leachable contaminants will migrate to surface waters. Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the east, towards the River Tame. As the majority of the off-site sources of contamination are located down hydraulic gradient they are unlikely to migrate to the site. There is a higher chance of an unacceptable risk being posed to the river from the off-site sources of contamination, than the site itself. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater. As the site may include welfare cabins and therefore require services (i.e. drainage), there is potential for the works to create preferential pathways to the controlled waters.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Cotton mills; Tanks; Unspecified factories, heaps, mills and ground workings; Electricity works; Scrap yard; Riverside Mills; Higher Glent Quarry; Current features surrounding the site including: Electricity substations; Factory; Tanks; Recycling businesses; and Industrial products including wood, charcoal, paper, card and board. Historical landfill:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers <u>Property –</u> Compound related facilities	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk Off-site sources of contamination are most likely down hydraulic gradient limiting their probability of migrating towards the site. Adjacent off-site sources to the west of the site, have the potential to migrate down hydraulic gradient to the site increasing the risk. It is unlikely that the works on-site will impact the groundwater regime off-site.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Former River Meadows Mills; Glent Quarry; and Northend Road [180 m south-east].					Any cohesive deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.
<i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	Moderate/low risk Historical landfills are located around the site which could be a potential source of ground gas, however none are within 100 m, limiting the potential for migration on to site. One coal seam is present on-site, however the depths are unknown. It is also only present in the eastern edge of the site therefore there is limited potential for impact. Another coal seam is present 77 m north of the site, increasing the possibility of gas migration.

1.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

2. BASELINE FOR HEYROD HALL OVERBRIDGE WORKS (MVL3/7) AND SITE COMPOUND

2.1 Site history

Table 2-1 provides a summary of the historical development at the Heyrod Hall site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure⁹.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 2-1 - Heyrod hall overbridge (MVL3/7) and site compound - Summary of historical development

Feature	Date	Distance from the site boundary	Direction from the site boundary
Railway Line	1863–present	0 m	on-site
Heyrod Hall Farm	1893-1933	0 m	on-site
Cuttings	1923	0 m	on-site
Unspecified tank	1965-1985	0 m	on-site
Electricity works	1965-1966	3 m	east
Cooling ponds	1954	9 m	east
Print works	1845-1907	13 m	south-east
Bone works	1933-1954	14 m	south
Chemical works	1918-1923	18 m	south-east
Unspecified heap	1918	72 m	south-east
Electricity works	1965-1995	108 m	south
Refuse heap	1906-1954	118 m	south-west
Refuse heap	1977	124 m	north-east
Unspecified tank	1910-1954	135 m	south
Filters	1907	147 m	south

⁹ Groundsure 2024, Enviro + Geo Insight (GS-QDD-QYJ-F7V-DK7)

Feature	Date	Distance from the site boundary	Direction from the site boundary
Unspecified pit	1918-1954	156 m	south
Refuse heap	1966-2003	170 m	south
Cuttings	1906-1923	183 m	south-west
Railway station	1899-1907	199 m	east
Tramway	1910	203 m	north
Unspecified tank	1964-1983	204 m	north-east
Electricity substation	1983-1992	217 m	north
Electricity substation	1992	241 m	north-east
Cuttings	1899-1923	242 m	north
Railway station	1899-1907	247 m	east
Unspecified commercial/industrial	1933	248 m	north-east

2.2 Published geology

A summary of the published geology relevant to the MVL3/7 Heyrod Hall Overbridge Works and Site Compound is provided below. The data has been sourced from Groundsure¹⁰ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is recorded on-site and off-site to the east and south. Made Ground may be associated with historical development on-site or in proximity to the site including unspecified tanks, unspecified heaps, unspecified pits, cooling pits, and cuttings.

Superficial deposits

The 1:10,000 scale published geology maps indicate that Head deposits are recorded underlying the majority of the site. No superficial deposits are recorded below the north-west of the site. Alluvium (9 m east), Till (141 m south-east) and Glaciofluvial sheet deposits (238 m east) are also recorded within 250 m of the site.

Bedrock

The 1:10,000 scale published geology indicates there is one bedrock geology designation recorded on-site. There are two other bedrock geology designations recorded within 250 m of the site. A summary of the bedrock

geology recorded on-site and within 250 m of the site boundary is provided in Table 2-2. Figure 2-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer; no bedrock information is included in this report.

Table 2-2 - Heyrod hall overbridge (MVL3/7) and site compound - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional details
Fletcher Bank Grit	0 m	on-site	Sandstone
Marsden Formation	21 m	east	Mudstone and siltstone
	22 m	west	
	159 m	north	
Fletcher Bank Grit	154 m	north	Sandstone
Huddersfield White Rock	222 m	west	Sandstone

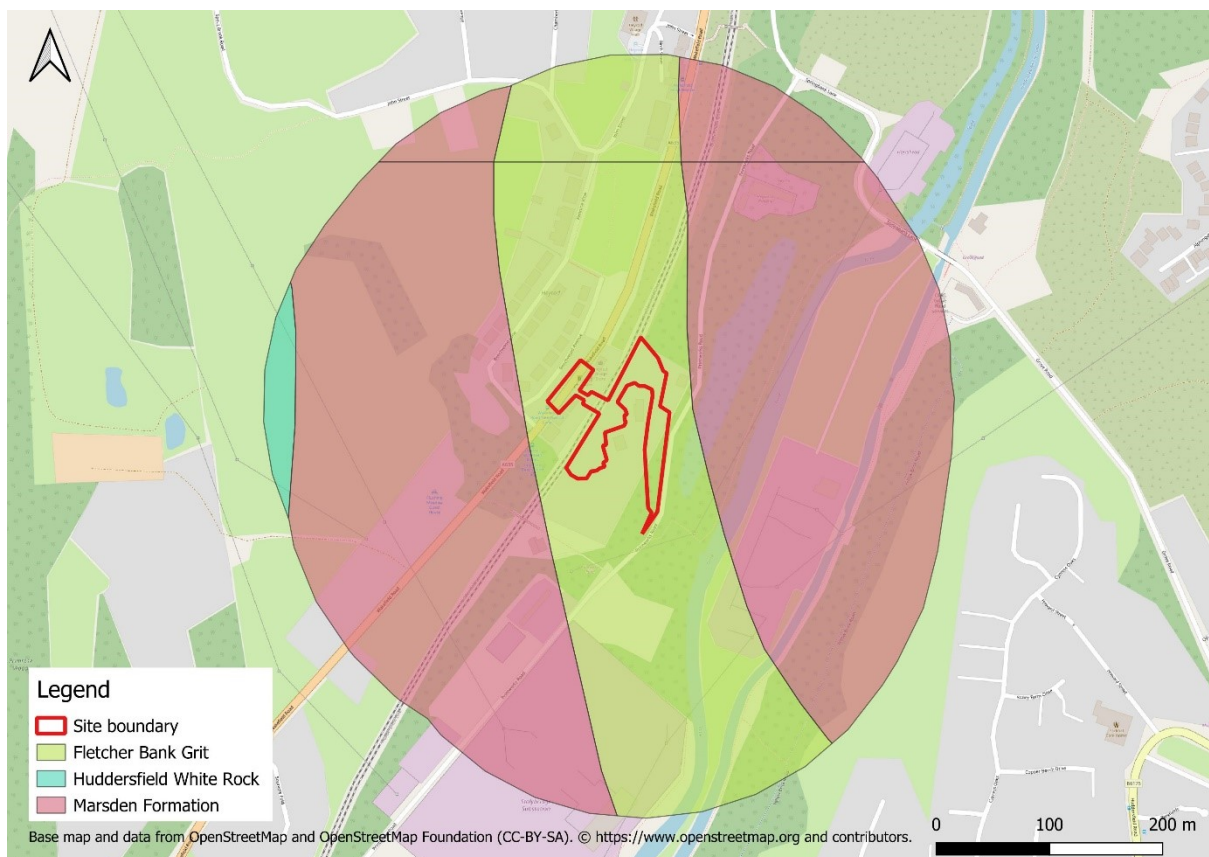


Figure 2-1 - Heyrod hall overbridge (MVL3/7) and site compound - Summary of bedrock and linear features

Faults and Linear Features

The 1:10,000 scale published geology indicates there are no bedrock faults on-site or within 250 m of the site. There are two other linear features within 250 m of the site; linear features are visible in Figure 2-1.

Table 2-3 - Heyrod hall overbridge (MVL3/7) and site compound - Summary of bedrock faults

Category	Description	Distance from the site boundary	Direction from the site boundary
Fossil horizon	Fossil horizon, marine band	192 m	north-west
Fossil horizon	Fossil horizon, marine band	202 m	north-west

2.3 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁰ indicates that there are no designated superficial aquifers on-site. There is a secondary A aquifer located 21 m south-east of the site (associated with the off-site Alluvium), a secondary A aquifer located 195 m north-east and a secondary undifferentiated aquifer located 133 m south-east (associated with the Devensian Till deposits). The Environment Agency provides the following aquifer designation descriptions:

Secondary A aquifer: Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; and

Secondary undifferentiated aquifer: Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Bedrock aquifers

The data from Groundsure¹⁰ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure¹⁰ data indicates that the groundwater vulnerability is low for the bedrock aquifer. A low vulnerability classification is assigned to areas that provide the greatest protection from pollution.

Groundwater source protection zones

The data from Groundsure¹⁰ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹⁰ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁰ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

2.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹⁰ as an unnamed watercourse and is located on-site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 2-4.

Table 2-4 - Heyrod hall overbridge (MVL3/7) and site compound - Surface watercourses

Name of watercourse	Type	Distance from site	Direction from site	WFD overall classification
Unnamed watercourse	On ground surface watercourse	0 m	on-site	-
Unnamed watercourse	Reservoir	25 m	east	-
Tame (Chew Brook to Swineshaw Brook) (southern flow)	River	64 m	east	Moderate
Unnamed watercourse	On ground surface watercourse	84 m	west	-
Huddersfield Narrow Canal west section	Canal	153 m	south-east	Moderate
Unnamed watercourse	Manmade watercourse	165 m	north-east	-
Unnamed watercourse	On ground surface watercourse	222 m	south-east	-

Surface water discharge consents

The data from Groundsure¹⁰ indicates there are no licensed discharges to surface water features on-site. There is one licensed discharge to surface water features within 250 m of the site. In addition, there are no pollutant releases to surface water features on-site or within 250 m of the site. A summary of all surface water discharge consents within 250 m of the site has been provided in Table 2-5.

Table 2-5 - Heyrod hall overbridge (MVL3/7) and site compound - Surface water discharge consents

Permit number	Address	Receiving water	Effluent Type	Distance from site	Direction from site	Effective date
016993648	Stalybridge Substation Outfalls, Printworks Road, Wakefield Road, Heyrod, Stalybridge, SK15 2PW	River Tame	Trade discharges – site drainage- (contam surface water)	159 m	south	12/11/2004 – 11/08/2010 (revoked)
016993678	Grove Road CSO, Springfield Bank Lane, Stalybridge, Cheshire, SK15 3RL	River Tame	Sewage discharges – sewer storm overflow – water company	248 m	north-east	22/02/2021 - present

Surface water abstractions

The data from Groundsure¹⁰ indicates there are no surface water abstractions within 250 m of the site.

2.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁰ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

2.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁰ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 2-6.

Table 2-6 - Heyrod hall overbridge (MVL3/7) and site compound - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal mining areas	The site is located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site. There is one other non-coal mining area within 250 m of the site, located 154 m north. Both are for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There is one brit pit within 250 m of the site, located 5 m south. It is a surface mineral working, for sandstone, but at date of entry, has ceased to extract minerals.
Surface ground workings	There is one surface ground workings feature on-site. There are 14 other surface ground workings features within 250 m of the site. Details are provided in Table 2-7.
Underground workings	There are no underground workings on-site or within 250 m of the site.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 2-7 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 2-7 - Heyrod hall overbridge (MVL3/7) and site compound - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1923
Pond/ Reservoir	6 m	east	1899-1995
Pond	22 m	south-east	1907-1954

Name	Distance from site	Direction from site	Date
Unspecified heap	72 m	south-east	1918
Reservoir	108 m	south-east	1899-1907
Refuse heap	118 m	south-west	1918-1954
Refuse heap	124 m	north-east	1977
Canal	125 m	south-east	1899-1954
Unspecified heap	128 m	south-west	1906-1938
Pond	146 m	south	1899-1938
Unspecified pit	159 m	south	1918-1938
Disused canal	172 m	south-east	1977-1995
Unspecified pit	180 m	south	1933-1954
Cuttings	183 m	south-west	1907-1954
Cuttings	242 m	north	1899-1923

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high-risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁰ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 2-8, however, no licence details have been provided by Groundsure.

Table 2-8 - Heyrod hall overbridge (MVL3/7) and site compound - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site
Historical landfill (LA/mapping records)	Refuse tip (potential landfill)	-	44 m	south
Historical landfill (LA/mapping records)	Refuse tip (potential landfill)	-	121 m	north-east
Waste exemptions	Heyrod Hall Compound, Printworks Road, Stalybridge, SK15 3BD	Storage of waste in secure containers	14 m	south
		Storage of waste in a secure place		
		Use of waste in construction		

2.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

2.8 Sensitive land use

The data from Groundsure¹⁰ indicates there is a site of special scientific interest (SSSI) within 250 m of the site. The site is located within a SSSI impact zone. There are no further sensitive land uses including, Ramsar sites or areas of conservation, within 250 m of the site. A summary of sensitive land use designations is provided in Table 2-9.

Table 2-9 - Heyrod hall overbridge (MVL3/7) and site compound - Sensitive land use summary

Designation type	Site name	Additional description	Distance from site	Direction from site
Sites of Special Scientific Interest (SSSI)	Huddersfield Narrow Canal	-	147 m	south-east

2.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There is one pollution incident reported by Groundsure¹⁰ within 250 m of the site and a summary has been provided in Table 2-10.

Table 2-10 - Heyrod hall overbridge (MVL3/7) and site compound - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Sewage materials – crude sewage	40 m	south-east	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	05/12/2001

Pollution prevention and controls

The data from Groundsure¹⁰ indicates there are not Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure¹⁰ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁰ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁰ indicates there are no recent industrial uses on-site. There are five recent industrial uses within 250 m of the site, all of which relate to electricity substations; the closest of which is located 67m south-west of the site.

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure¹⁰.

Contaminated land designations

According to Groundsure¹⁰, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

2.10 Site area reconnaissance

A site walkover was undertaken on 25 November 2024 by two AtkinsRéalis environmental scientists. A summary of the observations made during the visit is provided as follows.

Table 2-11 – Heyrod hall overbridge (MVL3/7) and site compound - Site walkover record

Item	Description
Location	<p>The site is located on Third Party land. The site is located to west of Printworks Road, Heyrod. The site is off-track with national grid reference SJ 97239 99737 and What3Words of goes.silk.clouds.</p> <p>The site is accessed via a field gate on Printworks Road. The site covers an area of 0.538 Ha, providing a sloping pathway between the Heyrod Hall overbridge and residential properties and Printworks Road. The site bounds Wakefield Road to the north, residential properties to the east, Printworks Road to the south and the railway to the west.</p>
Description of current use/ activities	The site comprises a sloped private pathway for access to residential properties.
Fuel/chemical storage	No evidence of fuel storage was observed.
Evidence of land contamination	No evidence of land contamination was observed.
Invasive Species	Himalayan Balsam was present on either side of the pathway.
Surface coverage	The site surface comprised of 40% vegetation and 60% gravelly compressed soil.
Boundary Types	Retaining walls were present along the entire east side of the site, with intermittent walls and temporary fencing along the western site boundary.
Surface Water Features	No surface water features were visible.

2.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of the current existing land use and future use of the site as a construction compound. It is assumed the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical on-site uses including:
 - Railway line; and
 - Unspecified tanks.
- Off-site:
 - Historical features surrounding the site including:
 - Electricity substations;
 - Print works, bone works, chemical works;
 - Refuse heaps;
 - Canals; and
 - Railway stations.
 - Current features surrounding the site including:
 - Electricity substations;
 - Residential buildings; and
 - Commercial buildings.
- Pollution Incident:
 - Sewage materials.

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground gases.

Potential receptors

The following receptors have been identified at the site based on an open space end use as an overbridge and storage compound:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
 - Off-site:
 - Residents and occupiers of commercial/ industrial premises; and
 - Users of public space areas.
- Controlled Waters:
 - Groundwater: Bedrock secondary A aquifer (Fletcher Bank Grit); and
 - Surface Water:
 - River Tame; and
 - Huddersfield Narrow Canal.
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores etc);
 - Off-site:

- Commercial businesses; and
- Residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground gas.
- Controlled Waters:
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate

risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 2-12 - Heyrod hall overbridge (MVL3/7) and site compound - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Railway line Unspecified tanks Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – Construction workers Future site users <u>Property</u> – Compound related facilities <u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, use of public open spaces. <u>Property and Services</u> – Commercial businesses and residential properties.	Low Unlikely	Medium Severe	Moderate/low risk Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses to the north/northwest area of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction. Members of the TRU workforce are likely to be present on the site frequently as the compound will provide parking on-site, storage areas and portacabins, increasing the likelihood of exposure to any contaminants present in made ground on-site. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks. The site is unlikely to be used after construction of the railway is complete, therefore it is unlikely anyone could come into contact with contaminants in areas of the site. Moderate/low risk Made Ground and potentially infilled cuttings are anticipated to be present on the site, which may be a source of ground gas.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	accumulation (explosion). Inhalation of ground gas (asphyxiation).				Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. However, welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.
	Inhalation of asbestos fibres.		Unlikely	Severe	Moderate/low risk As there are no former buildings on-site, the likelihood of asbestos being present is unlikely. The majority of the site will be covered in hardstanding therefore it is unlikely that contact with the Made Ground or infilled ground will occur. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health. If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing	<u>Groundwater</u> <u>Controlled</u> <u>Waters</u> – Bedrock secondary A aquifer	Low	Medium	Moderate/low risk The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. There are superficial deposits of Head underlying the majority of the site. The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	drainage, foul sewer, proposed service pipes/trenches, piled foundations.				If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – Huddersfield Narrow Canal west section River Tame	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to surface waters. Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the east, towards the River Tame. Therefore, new works could create new migration pathways towards the River. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	On-site: <u>Human Health</u> – Construction workers <u>Property</u> –	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Historical features surrounding the site including: Electricity substations; Print works, bone works, chemical works; Refuse heaps; Canals; and Railway stations. Current features surrounding the site including: Electricity substations; Residential buildings; and Commercial buildings. Pollution Incident:	Inhalation of airborne asbestos fibres	Compound related facilities	Low	Medium	<p>off-site not covered with hardstanding, buildings or vegetation.</p> <p>It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted. However it is unlikely that off-site sources of contamination will be considered in produced risk assessments.</p> <p>Moderate/low risk</p> <p>Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.</p>
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	<p>Moderate/low risk</p> <p>A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses.</p> <p>The majority of the off-site contaminative land uses are to the east of the site. Therefore, any possible contaminants are likely to travel down hydraulic gradient towards the River Tame rather than towards the site.</p> <p>Furthermore, there are no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Sewage materials [44 m south-east] <i>Possible contaminants include: Asbestos Metals PAHs Petroleum hydrocarbons VOCs PCBs Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Unlikely	Medium	Low Risk There are no landfills or coal seams present within 250 m of the site, therefore there are no significant sources of ground gas present. Portacabins built on the compound are likely to have a void between the floor and the ground which will prevent an ingress of ground gas. However, installation of drainage could create preferential pathways for the migration of gas to the site.

2.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

3. BASELINE FOR MANCHESTER ROAD FOOTBRIDGE WORKS MVL3/10A

3.1 Site history

Table 3-1 provides a summary of the historical development of the Manchester Rd site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure¹⁰.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 3-1 – Manchester Road Footbridge Works MVL3/10A - Summary of historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Railway sidings	1899-1970	0 m	on-site
Corporation sewage works	1906-1938	0 m	on-site
Allotment gardens	1964-1965	0 m	on-site
Unspecified tanks	1906-1910	2 m	west
Railway line	1863-present	2 m	east
Unspecified pit	1899	3 m	south-west
Tramway	1909-1933	20 m	east
Unspecified tanks	1906-1923	22 m	east
Sewage works	1918-1992	37 m	south-east
Tanks	1909-1933	71 m	north-east
Unspecified heap	1956	74 m	north
Filter beds	1906-1923	86 m	north-east
Weir mill (cotton)	1845-1956	93 m	north
Unspecified works	1970-1992	114 m	north

¹⁰ Groundsure 2024, Enviro + Geo Insight (GS-IEK-4UK-Z3U-RF1).

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified quarry	1899-1933	124 m	south
Unspecified pit	1906-1992	125 m	south-west
Unspecified old quarry	1918-1923	129 m	south
Filter beds	1918-1923	147 m	south-east
Unspecified pit	1899-1956	149 m	south
Unspecified tank	1872	152 m	east
Filter beds	1918-1923	166 m	south-east
Railway sidings	1970	191 m	east
Cuttings	1899-1923	201 m	east
Unspecified tank	1872	213 m	north-east
Unspecified heap	1970-1982	228 m	north-east
Cuttings	1907	230 m	east
Railway sidings	1906-1956	243 m	east

3.2 Published geology

A summary of the published geology relevant to the Manchester Road Footbridge works MVL3/10A is provided below. The data has been sourced from Groundsure¹¹ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicated there are no Made Ground features mapped on-site. Made Ground is recorded within 250 m of the site, located 52 m east at its closest point.

Superficial deposits

The 1:10,000 scale published geology maps indicate that Head deposits are recorded in the north-west of the site, with the remainder of the site not mapped as being underlain by superficial deposits. Alluvium (103 m east), Devensian Till (115 m east) and Glaciofluvial ice contact deposits (227 m north-east) are recorded within 250 m of the site.

Bedrock

The 1:10,000 scale published geology indicates there are two bedrock geology designations on-site and a further four other bedrock geology designations within 250 m of the site.

A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 3-2. Figure 3-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 3-2 - Manchester Road Footbridge Works MVL3/10A - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional details
Fletcher Bank Grit	0 m	on-site	Sandstone
Marsden Formation	0 m	on-site	Mudstone and siltstone
Huddersfield White Rock	58 m 101 m	west west	Sandstone
Marsden Formation	70 m 77 m 134 m 200 m 215 m 232 m	east south-west west south east south-west	Mudstone and siltstone
Rossendale Formation	94 m 139 m 202 m	west west west	Mudstone and siltstone
Fletcher Bank Grit	96 m 200 m	north-east south	Sandstone
Rough Rock Flags	180 m	west	Sandstone
Rough Rock	213 m	west	Sandstone



Figure 3-1 - Manchester Road Footbridge Works MVL3/10A - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are two bedrock faults on-site. There are other linear features noted within 250 m of the site, a summary is provided in Table 3-3. Faults are visible in Figure 3-1.

Table 3-3 - Manchester Road Footbridge Works MVL3/10A – Summary of faults and linear features within 250 m of the site

Category	Description	Distance from the site boundary	Direction from the site boundary
Fault	Normal fault, inferred; orientated north-east to south-west	0 m	on-site
Fault	Normal fault, inferred; orientated north-east to south-west	0 m	on-site
Fossil horizon	Fossil horizon, marine band	0 m	on-site

Category	Description	Distance from the site boundary	Direction from the site boundary
Fossil horizon	Fossil horizon, marine band	0 m	on-site
Fossil horizon	Fossil horizon, marine band	0 m	on-site
Fossil horizon	Fossil horizon, marine band	13 m	west
Rock	Coal seam, inferred coincident with bedrock geology boundary	77 m	north-west
Fossil horizon	Fossil horizon, marine band coincident with bedrock geology boundary	88 m	north-west
Fossil horizon	Fossil horizon, marine band	90 m	south
Fossil horizon	Fossil horizon, marine band	109 m	south
Rock	Coal seam, inferred coincident with bedrock geology boundary	137 m	west
Fossil horizon	Fossil horizon, marine band coincident with bedrock geology boundary	142 m	west
Fault	Normal fault, inferred; orientated east to west	200 m	south
Fossil horizon	Fossil horizon, marine band	245 m	south

3.3 Hydrogeology

Superficial aquifers

The data from Groundsure¹¹ indicates that there are no designated superficial aquifers on-site. The Groundsure report indicates that a secondary Undifferentiated aquifer is located 97 m north-east of the site (associated with Devensian Till) and a secondary A aquifer is located 107 m south-east of the site (associated with Alluvium). The Environment Agency provides the following descriptions for the aquifers recorded:

Secondary Undifferentiated: Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have

previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Secondary A: Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Bedrock aquifers

The data from Groundsure¹¹ indicates the bedrock underlying the site and surrounding 250 m area is classified as a secondary A aquifer (associated with Fletcher Bank Grit and Marsden Formation).

Groundwater vulnerability

According to the data within the Groundsure report¹¹ the groundwater vulnerability for the bedrock aquifer is considered to be low. This indicates that the site is located within an area that provides the greatest protection from pollution.

Groundwater source protection zones

The data from Groundsure¹¹ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹¹ indicates there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹¹ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

3.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹¹ as the River Tame and is located 86 m north-east. There are four further surface water features within 250 m of the site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 3-4.

Table 3-4 - Manchester Road Footbridge Works MVL3/10A - Surface water courses

Name of Watercourse	Type	Distance from site	Direction from site	WFD Overall Classification
Tame (Chew Brook to Swineshaw Brook)	River	86 m	north-east	Moderate
Unnamed watercourse	On ground surface watercourse – discharges to River Tame	135 m	north	-
Huddersfield Narrow Canal west section	Canal	135 m	east	Moderate
Unnamed watercourse	On ground surface watercourse – discharge to River Tame	165 m	south	-

Surface water discharge consents

The data from Groundsure¹¹ indicates there are no licensed discharges to surface water features on-site. There is a single licensed discharge permit (016940089), of which there are 20 variations within 250 m of the site, the closest of which is located 108 m east of the site. The permit is operated by a water company and is associated with sewage discharge or storm water overflow into the River Tame. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Surface water abstractions

The data from Groundsure¹¹ indicates there are no surface water abstractions within 250 m of the site.

3.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹¹ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

3.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹¹ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 3-5.

Table 3-5 - Manchester Road Footbridge Works MVL3/10A - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	Published geology records two coal seams within 250 m of the site, 83 m north-west and 134 m west.
Coal mining areas	The site is located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There is one brit pit within 250 m of the site. This is located 136 m south. It is a surface mineral working, for sandstone, but at date of entry, has ceased to extract minerals.
Surface ground workings	There is one surface ground workings features on-site. There are 17 other surface ground workings features within 250 m of the site. Details are provided in Table 3-6.
Underground workings	There are no underground workings on-site or within 250 m of the site.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 3-6 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 3-6 - Manchester Road Footbridge Works MVL3/10A - Surface ground workings

Name	Distance from site	Direction from site	Date
Corporation sewage works	0 m	on-site	1907-1956
Unspecified Pit	3 m	south-west	1899
Sewage Works	17 m	east	1906-1938
Sewage Works	37 m	south-east	1918-1992
Unspecified Heap	74 m	north	1956
Filter Beds	79 m	east	1906-1923

Name	Distance from site	Direction from site	Date
Canal	117 m	east	1906-1938
Sewage Works	117 m	south-east	1923-1938
Unspecified Quarry	124 m	south	1899
Canal	125 m	east	1899-1907
Unspecified Pit	125 m	south-west	1956-1992
Disused Canal	126 m	east	1907-1992
Unspecified Pit	127 m	south-west	1938
Unspecified Ground Workings	129 m	south-west	1906
Unspecified Old Quarry	129 m	south	1918-1933
Filter Beds	147 m	south-east	1918-1923
Unspecified Pit	153 m	south	1899-1956
Cuttings	211 m	east	1899-1923
Unspecified Heap	228 m	north-east	1970-1982

The Mining Authority Remediation viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹¹ records landfills and waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 3-7, however, licence details have not been provided by Groundsure.

Table 3-7 - Manchester Road Footbridge Works MVL3/10A - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site
Historical landfill (LA/mapping records)	Refuse Tip (potential landfill)	-	184 m	north-east
Waste exemptions	-	Disposal by incineration (Ref. WEX290877)	142 m	south
	-	Disposal by incineration Ref. WEX273000	153 m	south

Category	Site name or Address	Description of waste	Distance from site	Direction from site
	Weir Mill, Manchester Road, Mossley, Ashton, OL5 9QA	Use of waste in construction Ref. WEX304151	239 m	north
		Use of waste in construction Ref. WEX170498	239 m	north

3.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

3.8 Sensitive land use

The data from Groundsure¹¹ indicates there is a site of special scientific interest (SSSI) within 250 m of the site. The SSSI is associated with Huddersfield Narrow Canal. The site is also located within a SSSI impact zone. There are no further sensitive land uses including, Ramsar or areas of conservation, within 250 m of the site.

3.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are no pollution incidents reported by Groundsure¹¹ within 250 m of the site.

Pollution prevention and controls

The data from Groundsure¹¹ indicates there are not Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure¹¹ indicates there are no Control of Major Accident Hazards (COMAH) sites within 250 m of the site. However, a planning hazardous substance consent has been recorded within 250 m of the site. A summary has been provided in Table 3-8.

Table 3-8 - Manchester Road Footbridge Works MVL3/10A - Planning hazardous consents

Type	Site	Description	Receiving water	Distance from site	Direction from site	Status
List 1 dangerous substances	Mossley Electroplaters Ltd, Weir Mill, Mossley	Cadmium	River Tame, Manchester Ship Canal	210 m	north	Active

Radioactive substances

The data from Groundsure¹¹ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹¹ indicates there are no recent industrial land uses on-site. There are six recent industrial land uses within 250 m of the site. A summary has been provided in Table 3-9.

Table 3-9 - Manchester Road Footbridge Works MVL3/10A - Contemporary trade directory

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Electricity substation	Infrastructure and facilities	Electrical features	99 m	south-east
Sewage works	Infrastructure and facilities	Waste storage, processing and disposal	134 m	north-east
Sewage works	Infrastructure and facilities	Waste storage, processing and disposal	157 m	south-east
Works	Industrial features	Unspecified works or factories	195 m	north
Chicago Coating Co	Industrial products	Industrial coatings and finishings	217 m	north
Electricity Poles	Infrastructure and facilities	Electrical features	249 m	south

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure¹¹.

Contaminated land designations

According to Groundsure¹¹, there are no sites designated as contaminated land under part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

3.10 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and potential future use following proposed reconstruction of the existing footbridge.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with former developments on-site:
 - Sewage works; and
 - Railway sidings.
 - Historical on-site uses including:
 - Unspecified pits; and
 - Unspecified tanks.
- Off-site:
 - Historical features surrounding the site including:
 - Tanks;

- Filter beds;
- Sewage works; and
- Unspecified quarries.
- Current features surrounding the site including:
 - Electricity substations; and
 - Sewage works.

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia, nitrates, phosphates;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), fuel oils, polyelectrolytes, volatile and semi volatile organic compounds (VOCs/SVOCs);
- pathogens; and
- ground gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
 - Off-site:
 - Residents and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:

- Groundwater: Bedrock secondary A aquifer;
- Surface Water:
 - River Tame; and
 - Huddersfield Narrow Canal west section.
- Property and Services:
 - On-site: structures (footbridge) and services.
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground gas.
- Controlled Waters
 - leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipe services, shallow worked coal seams; and

- surface water run-off.
- Property and Services:
 - ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 3-10 - Manchester Road Footbridge Works MVL3/10A - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>on-site</u> sources:</p> <p>Made Ground associated with:</p> <p>Sewage works; and</p> <p>Railways sidings.</p> <p>Historical on-site uses including:</p> <p>Unspecified pits and tanks.</p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>Human Health</u></p> <p>Construction workers</p> <p>Future users of the bridge</p>	Low	Medium	<p>Moderate/low risk</p> <p>Based on the site history and recent land use, there is potential for contaminants to be present in soil and groundwater on-site. Future site users are unlikely to come into contact with soil as the site is made up of hardstanding.</p> <p>It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
<p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p> <p><i>Petroleum hydrocarbons</i></p> <p><i>PCBs</i></p>	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p>		Unlikely	Medium	<p>Low Risk</p> <p>There is a possibility of Made Ground to be found on-site that is not currently known, which may be a source of ground gas.</p> <p>The site does not require any confined or indoor spaces therefore accumulation of ground gas is unlikely.</p>
	Inhalation of asbestos fibres.		Low	Severe	<p>Moderate risk</p> <p>Asbestos could be present as a result of previous developments that have then been demolished. Based on the potential presence of asbestos in made ground, that is associated with potential</p>

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<p><i>Volatile organic compounds (VOCs)</i></p> <p><i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>				<p>former building demolitions, additional ground investigation is required to substantiate or discount this potential risk.</p> <p>The site is covered in hardstanding therefore it is unlikely that contact with any potential Made Ground will occur, and the site is unlikely to be altered following the construction works.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p>
<p>Direct contact of foundations/services with aggressive soils and or groundwater.</p>	<p><u>Property and Services</u> – Footbridge Storage area</p>	<p>Unlikely</p>	<p>Medium</p>	<p>Low Risk</p> <p>Concrete piled foundations will be installed to improve the existing footbridge. The correct concrete classification will need to be decided and used to mitigate risks from aggressive soils and groundwater.</p>
<p>Chemical attack to buried structures.</p>				
<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration</p> <p>Lateral and vertical migration through Made Ground, superficial deposits and bedrock.</p> <p>Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.</p>	<p><u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>The proposed development includes the use of piled foundations based on current design. As superficial deposits are not underlying the majority of the site, drilling will occur into bedrock from potential Made Ground creating potential preferential pathways.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer.</p> <p>If Made Ground is present, there is potential for leaching of contaminants into groundwater in the bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from</p>

					precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater. Superficial deposits found on-site are only located in the north-west of the site, therefore are not likely to be a continuous aquifer.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> River Tame Huddersfield Narrow Canal west section	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is likely that leachable contaminants will migrate to surface waters. Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the east, towards the River Tame. Therefore, on-site sources are likely to migrate to the river. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources: Historical features surrounding the site including: Tanks; Filter beds;	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>Human Health</u> Residents and occupiers of commercial/ industrial premises, Users of public open space <u>Property and Services</u> – Commercial businesses	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is possible for future site users to come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised.

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Sewage works; Unspecified quarries; and Railway buildings.		and residential properties			It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
Current features surrounding the site including: Electricity substations; and Sewage works. Potential landfill: Refuse tip [184 m north].	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Some off-site sources are located on the other side of the River Tame, which likely prevent any contaminants from these sources migrating to the site and impacting the groundwater beneath the site. Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.
<i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	Moderate/low risk A potential landfill is located 184 m off the site, which could be a potential source of ground gas. However, it is unlikely that any ground gas generated will be sufficient enough to travel the distance to the site and have an impact. There are no new confined spaces within the development, however piles may create a new pathway to the surface which may pose a risk during construction.

3.11 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through a compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required in order to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

The potential risks to human health and controlled waters associated with piling at the site would be considered within a piling risk assessment, as required, with the appropriate mitigation implemented through the CoCP.

4. BASELINE FOR THE SCOUT WEST LAYDOWN AREA AND RAMP ACCESS

4.1 Site history

Table 4-1 provides a summary of the historical development of the Scout West site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m has been determined principally by reference to historical maps obtained from Groundsure¹¹.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 4-1 - Scout west laydown area and ramp access - Summary of historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Scout Tunnel	1863-present	0 m	on-site
Railway line	1863-present	1 m	west
Electricity substation	1954-2003	1 m	east
Scout Mill (becomes New Scout Mill)	1845-2003	2 m	east
Weir mill (cotton)	1863-2003	8 m	east
Unspecified works	1970-1992	8 m	east
Unspecified old quarry	1898-1923	31 m	south-east
Weir mill (cotton)	1863-1922	40 m	south-east
Reservoir	1894-1992	50 m	north
Brick works	1892-1894	75 m	north-west
Tunnel	1898- 1992	77 m	east
Corporation sewage works	1906-1938	102 m	south
Tanks	1872-1933	111 m	south
Unspecified heap	1956	116 m	south
Filter beds	1906-1923	120 m	south-east

¹¹ Groundsure 2025, Enviro + Geo Insight (GS-7GY-VBF-9JS-IUR)

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified heap	1956-1982	135 m	east
Cuttings	1891-1992	152 m	north
Railway Sidings	1891-1938	152 m	north
Unspecified Tank	1872	175 m	south-east
Cuttings	1899-1992	184 m	south-east
Unspecified Tank	1954-1955	194 m	north-west
Railway Sidings	1892-1956	199 m	east
Goods Shed	1906-1938	202 m	north-east
Railway Building	1891	212 m	north-east
Cuttings	1907	240 m	south-east
Refuse Heap	1933-1956	245 m	north-east

4.2 Published geology

A summary of the published geology relevant to the Scout West Laydown Area and Ramp Access is provided below. The data has been sourced from Groundsure¹² and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 10:000 scale published geology maps indicated that Made Ground is not mapped on-site. Made Ground is recorded within 250 m of the site, the closest of which is located 35 m south-east.

Superficial deposits

The 10:000 scale published geology maps indicate that there are no superficial deposits recorded on-site. There are superficial deposits recorded within 250 m of the site. A summary is provided in Table 4-2.

Table 4-2 - Scout west laydown area and ramp access - Summary of superficial deposits

Description	Distance from site boundary	Direction from site boundary	Additional details
Till, Devensian	39 m	south-east	Diamicton
Head	61 m	west	Clay, silt, sand and gravel
Glaciofluvial ice contact deposits, Devensian	79 m	south-east	Sand and gravel

Description	Distance from site boundary	Direction from site boundary	Additional details
Alluvium	96 m	east	Clay, silt, sand and gravel

Bedrock

The 10:000 scale published geology maps indicate there is one bedrock designation underlying the site. There are five other bedrock designations within 250 m of the site. A summary is provided in Table 4-3. Figure 4-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 4-3 - Scout west laydown area and ramp access - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional details
Marsden Formation	0 m 69 m	on-site west	Mudstone and siltstone
Fletcher Bank Grit	14 m 243 m	east south-east	Sandstone
Huddersfield White Rock	44 m	west	Sandstone
Rossendale Formation	79 m 238 m	west west	Mudstone and siltstone
Rough Rock Flags	224 m	west	Sandstone
Fletcher Bank Grit	243 m	south-east	Sandstone

Figure 4-1 - Scout west laydown area and ramp access - Summary of bedrock and other linear features

Faults and linear features

The 1:10,000 scale published geology maps indicate there is one linear feature on-site. There are two other linear features within 250 m of the site. There is a coal seam, and a fault also recorded within 250 m of the site. A summary is provided in Table 4-4. Faults are visible in Figure 4-1.

Table 4-4 - Scout west laydown area and ramp access - Summary of faults and linear features within 250 m of the site

Category	Description	Distance from site boundary	Direction from site boundary
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Fossil horizon	Fossil horizon, marine band	0 m	on-site
Fossil horizon	Fossil horizon, marine band	1 m	north-east
Rock	Coal seam, inferred coincident with bedrock geology boundary	70 m	north-west
Fossil horizon	Fossil horizon, marine band coincident with bedrock geology boundary	80 m	north-west
Fault	Normal fault, inferred; crossmarks on downthrow side	243 m	south-east

4.3 Hydrogeology

Superficial aquifers

The data from Groundsure¹² indicates there are no superficial aquifers recorded on-site. There are two superficial aquifers recorded within 250 m of the site. A secondary (Undifferentiated) aquifer located 51 m south-east, and a secondary A aquifer recorded 112 m east. The Environment Agency provides the following descriptions for the aquifers recorded:

Secondary Undifferentiated: Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Secondary A: Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Bedrock aquifers

The data from Groundsure¹² indicates a secondary A bedrock aquifer underlying the site, associated with the Marsden Formation.

Groundwater vulnerability

According to the data within the Groundsure report¹² the groundwater vulnerability for the bedrock aquifer is high for the majority of the site. The groundwater vulnerability in the south of the site is low for the bedrock aquifer. A high classification refers to “areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.” A low classification refers to “areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.”

Groundwater source protection zones

The data from Groundsure¹² and MAGIC website⁴ indicates the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹² indicates there are no groundwater abstractions on-site or within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹² indicates there are no groundwater discharge consents on-site or within 250 m of the site.

4.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹² as an unnamed watercourse and is located on-site. There are six further surface water features within 250 m of the site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 4-5.

Table 4-5 - Scout west laydown area and ramp access - Surface watercourses

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Unnamed watercourse	On ground surface watercourse – discharges to River Tame	0 m	on-site	-
Tame (Chew Brook to Swineshaw Brook)	River	28 m	south-east	Moderate
Unnamed watercourse	On ground surface watercourse – discharges to River Tame	60 m	south	-
Huddersfield Narrow Canal west section	Canal	79 m	east	Moderate
Unnamed watercourse	On ground surface watercourse	108 m	north-west	-
Unnamed watercourse	On ground surface watercourse – discharges to River Tame	127 m	north-east	-
Unnamed watercourse	On ground surface watercourse – discharges to canal	161 m	east	-

Surface water discharge consents

The data from Groundsure¹² indicates there are no licensed discharge to surface water features on-site. There is a licensed discharge permit (016940089) of which there are 12 variations within 250 m of the site, the closest of which is located 101 m south-east of the site. The permit is operated by Mossley sewage treatment works and is associated with sewage discharge and sewer storm overflow into the River Tame. There is also a discharge permit (01TAM0088) located 191 m north-east of the site.

The permit is operated by a water company and is associated with sewage discharge.

Surface water abstractions

The data from Groundsure¹² indicates there are no surface water abstractions within 250 m of the site.

4.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹² indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicated that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

4.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹² records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 4-6.

Table 4-6 - Scout west laydown area and ramp access - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	Published geology maps record one coal seam within 250 m of the site, located 69 m west of the site.
Coal mining areas	The site is located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site, for vein mineral. Underground min workings are uncommon, although the geology is similar to that worked elsewhere.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There are three other brit pits within 250 m of the site. Two of the brit pits are surface mineral working, for sandstone, but at date of entry have ceased to extract minerals (38 m west and 73 m east). One brit pit located 248 m north-east, is surface mineral working for sand, and has also ceased to extract minerals at date of entry.

Category	Summary
Surface ground workings	There are no surface ground workings features on-site. There are 70 other surface ground workings features within 250 m of the site. Details are provided in Table 4-7.
Underground workings	There is one underground working on-site. There is one other underground working within 250 m of the site. Details are provided in Table 4-7.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 4-7 provides further details on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 4-7 - Scout west laydown area and ramp access - Surface ground workings

Category	Name	Distance from site boundary	Direction from site boundary	Date
Underground workings	Tunnel	0 m	on-site	1892-present
Surface ground workings	Unspecified old quarry	35 m	south-east	1899-1933
Surface ground workings	Canal	63 m	east	1899-present
Surface ground workings	Reservoir	66 m	north	1906-1992
Surface ground workings	Brick works	75 m	north-west	1892
Underground workings	Tunnel	77 m	east	1899-present
Surface ground workings	Corporation sewage works	103 m	south	1906-1956
Surface ground workings	Unspecified heap	116 m	south	1956
Surface ground workings	Filter beds	120 m	south-east	1906-1923
Surface ground workings	Unspecified heap	135 m	east	1956-1982

Category	Name	Distance from site boundary	Direction from site boundary	Date
Surface ground workings	Cuttings	152 m	north	1891-1992
Surface ground workings	Cuttings	184 m	south-east	1923
Surface ground workings	Cuttings	184 m	east	1899-1992
Surface ground workings	Refuse heap	246 m	north-east	1933-1956

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹² records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 4-8. However, not all licence details have been provided by Groundsure.

Table 4-8 - Scout west laydown area and ramp access - Landfill and waste summary

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary	Licence issue date	Licence status
Waste Exemptions	Weir Mill, Manchester Road, Mossley, Ashton, OL5 9QA	Use of waste in construction	32 m	east	-	-
Waste Exemptions	Murphy Compound, Huddersfield Road, Mossley, Manchester, OL5 9QN	Use of waste in construction	39 m	east	-	-
Historical Landfill (1963 mapping)	Refuse Tip		70 m	south-east	-	-

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary	Licence issue date	Licence status
Historical Landfill	Land Off Egmont Street, Manchester Road	Inert, Commercial, Household	156 m	east	11/04/1985	Surrendered 28/04/1994

4.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

4.8 Sensitive land use

The data from Groundsure¹² indicates that a site of special scientific interest (SSSI) is located 69 m east of the site. The SSSI is associated with the Huddersfield Narrow Canal. The site is also located within a SSSI impact zone. There are no other sensitive land uses, including Ramsar or areas of conservation within 250 m of the site.

4.9 Regulatory land use

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are no pollution incidents reported by Groundsure¹² on-site or within 250 m of the site.

Pollution prevention and controls

The data from Groundsure¹² indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. There is one historical licensed pollutant release (part B) located 38 m east of the site, associated with cleaning.

Planning hazardous substance consents

The data from Groundsure¹² indicates there are Control of Major Accident Hazards (COMAH) sites/planning hazardous consents within 250 m of the site. A List 1 Dangerous Substance (Cadmium) consent is located 11 m south and is currently active.

Radioactive substances

The data from Groundsure¹² indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹² indicates there are no recent industrial land uses on-site. There are seven recent industrial land uses within 250 m of the site. A summary has been provided in Table 4-9.

Table 4-9 - Scout west laydown area and ramp access - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Electricity substation	Infrastructure and facilities	Electrical features	1 m	south-east
Chicago coating co.	Industrial products	Industrial coatings and finishings	27 m	east
Manchester guns	Industrial products	Arms and ammunition	32 m	east
Works	Industrial features	Unspecified works or factories	37 m	south-east
Irwell motors	Motoring	Secondhand vehicles	39 m	east
Sewage works	Infrastructure and facilities	Waste storage, processing and disposal	109 m	south
Mast (telecommunication)	Infrastructure and facilities	Telecommunications features	229 m	north-east

Active and current petrol stations

There are no active or current petrol stations recorded within 250 m of the site indicated by Groundsure¹².

Contaminated land designations

According to Groundsure¹², there are no sites designated as contaminated land on-site or within 250 m of the site.

4.10 Site area reconnaissance

A site walkover was undertaken on 17 March 2025 by an AtkinsRéalis Environmental Scientist. A summary of the observations made during the visit is provided as follows.

Table 4-10 – Scout west laydown area and ramp access - Site walkover record

Item	Description
Location	<p>The site is located on third party land in Mossley, Greater Manchester. The site is off-track with national grid reference SD 97264 01114 and What3Words of atom.open.appear.</p> <p>At the time of the walkover, permissions had not been granted for land access. Photos were therefore taken from the west on Manchester Road. The northern parcel of the site could not be observed.</p> <p>The compound covers an area of approximately 0.74 ha. The site slopes up from Manchester Road to the railway track, beginning behind existing industrial buildings on the north-eastern boundary and continuing south down Manchester Road. Residential properties are located along Manchester Road opposite the site.</p>
Description of current use/ activities	The site appears unused and vegetated.
Fuel/chemical storage	No evidence of fuel storage was observed.
Evidence of land contamination	No evidence of land contamination was observed.
Invasive Species	None observed from viewpoint.
Surface coverage	A vegetated embankment forms 100% of the visible site.
Boundary Types	A low retaining stone wall is present along the eastern side of the boundary. Behind the industrial compound is separated by a palisade fence.

Item	Description
Surface Water Features	No surface water features were visible.

4.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

Historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and future use of the site as a construction works compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with historical on-site uses including the Scout Tunnel.
- Off-site:
 - Historical features surrounding the site including:
 - Scout Mill;
 - Weir Mill;
 - Electricity substations;
 - Old quarry;
 - Reservoir;

- Brick works;
- Corporation sewage works;
- Filter beds;
- Tanks; and
- Made Ground associated with historical developments such as the railway line.
- Current features surrounding the site including:
 - Electricity substation;
 - Telecommunication mast; and
 - Sewage works.
- Historical landfill [156 m east].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:

- Resident and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Secondary A bedrock aquifer;
 - Secondary (Undifferentiated) superficial aquifer [51 m south-east]; and
 - Secondary A superficial aquifer [112 m east].
 - Surface water:
 - River Tame [28 m south-east];
 - Huddersfield Narrow Canal west section [79 m east]; and
 - Unnamed watercourses [0 m, 60 m, 108 m, 127 m, 161 m].
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and

- inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risk to construction workers/site visitors have therefore not been considered as part of this assessment.

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Table 4-11 - Scout west laydown area and ramp access - Initial Conceptual Site Model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Scout Tunnel	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – Construction workers Future site users	Unlikely	Medium	Low Risk Based on the site history and recent land use, there is limited potential for contaminants to be present in soil and groundwater on-site. Future site users could come into contact with contaminants in areas of the site not covered with hardstanding, buildings or vegetation.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>		<u>Property</u> – Compound related facilities <u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, users of public open space areas. <u>Property and Services</u> – Commercial businesses and residential properties			The site will be utilised as a compound resulting in the installation of parking on-site, storage areas and portacabins reducing the amount of possible contact with contaminants. The site is unlikely to be used after construction of the railway is complete and it is assumed that the site will be reinstated to its original condition. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion).		Low	Medium	Moderate/low risk Made Ground and infilled ground are anticipated to be present on the site, which may be a source of ground gas.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Inhalation of ground gas (asphyxiation).				Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. Welfare cabins associated with the construction compound are likely to have a void between the floor and ground therefore the ingress of gas is unlikely.
	Inhalation of asbestos fibres.		Unlikely	Severe	Moderate/low risk As there are no previous developments on the site, the potential for asbestos to be present is unlikely. During the site's use as a construction compound it is likely to comprise hardstanding or gravel, therefore it is unlikely that contact with the Made Ground or infilled ground will occur. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health. If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service	<u>Groundwater</u> <u>Controlled</u> <u>Waters</u> – Secondary A bedrock aquifer Secondary (Undifferentiated) superficial aquifer Secondary (A) superficial aquifer	Low	Medium	Moderate/low risk The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. As there are no superficial deposits underlying the site, Made Ground will be in direct contact with the bedrock, increasing the risk of contaminants leaching into the bedrock. As the site is to be used as a storage compound, it is unlikely that new pathways will be created. However, if development plans include works that will require new drainage to be installed, the pathway created will need to be considered.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	pipes/trenches, piled foundations.				<p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer.</p> <p>If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water</u> <u>Controlled Waters</u> – River Tame Unnamed watercourses Huddersfield Narrow Canal west section	Low	Medium	<p>Low Risk</p> <p>Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to surface waters located on-site.</p> <p>Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater.</p> <p>The hydraulic gradient is assumed to be towards the east, towards the River Tame, therefore limited contaminants are likely to reach the site as the majority of potential sources are east of the site.</p> <p>Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	On-site: <u>Human Health</u> – On-site users Construction workers <u>Property</u> –	Unlikely	Medium	<p>Low Risk</p> <p>Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site.</p> <p>It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Historical features surrounding the site including: Scout Mill; Weir Mill; Electricity substations; Old quarry; Reservoir; Brick works; Corporation sewage works; Filter beds; and Tanks.</p> <p>Made Ground associated with historical developments such as the railway line. Current features surrounding the site including: Electricity substation; Telecommunication mast; and Sewage works. Historical landfill [156 m east].</p> <p><i>Possible contaminants include: Asbestos Metals</i></p>		Compound related facilities			<p>off-site not covered with hardstanding, buildings or vegetation.</p> <p>The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised.</p> <p>It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.</p>
	Inhalation of airborne asbestos fibres.	<p><u>Off-site:</u> <u>Human Health</u> –</p> <p>Residents and occupiers of commercial/ industrial premises, users of public open space areas.</p>	Unlikely	Severe	<p>Moderate/low risk</p> <p>Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site.</p>
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.	<p><u>Property and Services</u> – Commercial businesses and residential properties.</p>	Low	Medium	<p>Moderate/low risk</p> <p>A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses.</p> <p>Any superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.</p>
	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	<p>Moderate/low risk</p> <p>Historical landfills are located more than 100 m away from the site, which limits the potential for ground gas migration. Also, the proposed use as a construction compound is not considered to be a sensitive land use in regard to gas risk.</p> <p>There is one coal seam located within 250 m of the site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
PAHs					
Petroleum					
hydrocarbons					
VOCs					
Ground gases					
(methane, carbon					
dioxide, hydrogen					
sulphide or carbon					
monoxide)					

4.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for this site.

5. BASELINE FOR PLEVINS SITE COMPOUND

5.1 Site history

Table 5-1 provides a summary of the historical development at the Plevins site and the surrounding 250 m buffer area. The history of the site and surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure¹².

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 5-1 – Plevins site compound - Summary of historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Coal Depot	1906-1938	0 m	on-site
Electricity Substation	1992-1996	0 m	on-site
Micklehurst Goods Station	1891-1956	0 m	on-site
Railway Sidings	1891-1956	0 m	on-site
Cheshire Street chemical works	1938	1 m	east
Albert Mill (cotton)	1922-1933	1 m	east
Brunswick Mill (woolen)	1955	1 m	east
Mossley Iron works	1891-1907	2 m	east
Tramway	1909-1933	3 m	north-west
Gas Governor	1992-1996	4 m	north-west
Bricks Works	1891	14 m	west
Unspecified Mill	1938	14 m	north-east
Unspecified Ground Workings	1907	20 m	east
Refuse Heap	1906-1956	28 m	north-west
Unspecified Tanks	1938	39 m	north-west
Unspecified Ground Workings	1938	44 m	north-west

¹² Groundsure 2024, Enviro + Geo Insight (GS-8D9-VXZ-U2J-COV)

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Feature	Date	Distance from site boundary	Direction from site boundary
Bankside Mill	1872	47 m	west
Unspecified Tank	1872-1955	46 m	east
Tanks	1922-1955	47 m	north-west
Sand Pit	1907	49 m	north-west
Electricity Substation	1975-1996	50 m	east
Unspecified Tanks	1918-1955	50 m	north-west
Cemetery	1872-1992	52 m	south-east
Iron Foundry	1892 – 1955	54 m	west
Electricity Substation	1955	56 m	east
Bronze Foundry	1955	60 m	west
Unspecified Tank	1954-1975	62 m	east
Electricity Substation	1954-1975	63 m	east
Tanks	1922	74 m	north-west
Unspecified Mills	1891-1938	74 m	west
Unspecified Tank	1954-1975	77 m	north-east
Unspecified Tanks	1918-1923	77 m	north-west
Refuse Heap	1906-1956	83 m	north-west
Unspecified Tank	1872	84 m	east
Unspecified Tank	1906-1992	85 m	west
Gasometer	1891-1922	92 m	west
Oil Tank	1933-1975	92 m	west
Refuse Heap	1907-1956	95 m	north-west
Southend Mill (cotton)	1863-1922	102 m	west
Wire Works	1938-1956	105 m	west
Gasometer	1872	120 m	east
Unspecified Tank	1872-1898	120 m	west
Unspecified Tank	1872	128 m	east
Engineering works	1955	129 m	north
Sand Pit	1906-1938	132 m	south-east
Tanks	1872-1922	132 m	south
Unspecified Works	1970-1992	137 m	west
Refuse Heap	1906-1923	139 m	west
Sand Pit	1907	145 m	west

Feature	Date	Distance from site boundary	Direction from site boundary
Electricity Substation	1992-1996	146 m	west
Unspecified Pit	1956	148 m	south-east
Unspecified Tank	1891	176 m	west
Unspecified Heap	1956-1992	178 m	west
Albert Mill (cotton	1863-1933	179 m	west
Garage	1975-1996	180 m	west
Unspecified Tank	1898-1975	180 m	west
Tunnel	1899-1992	182 m	south-west
Gasometer	1872-1894	183 m	west
Cuttings	1899-1992	188 m	south-west
Unspecified Tank	1894-1923	189 m	west
Victoria Mill (woolen)	1872-1955	200 m	north
Refuse Heap	1956	196 m	south-east
Unspecified Tank	1909-1933	200 m	west
Unspecified Old Quarry	1899-1933	206 m	south-west
Unspecified Mill	1906-1992	209 m	west
Tanks	1894-1909	213 m	south-west
Railway Sidings	1891-1938	215 m	north-west
Cotton Mill	1845	226 m	west
Unspecified Mills	1907-1938	230 m	east
Garage	1975-1992	237 m	west
Railway Building	1891	239 m	north-west
Goods Shed	1906-1938	240 m	north-west
Electricity Substation	1971-1992	241 m	east

5.2 Published geology

A summary of the published geology relevant to the Plevins Site Compound is provided below. The data has been sourced from Groundsure¹³ and British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is recorded on-site. Made Ground is also recorded within 250 m of the site. Made Ground may be associated with the historical development of the site

including railway buildings, iron works, unspecified mills and electricity substations.

Superficial deposits

The 1:10,000 scale published geology maps indicate that Devensian Till is recorded underlying the site. Alluvium is recorded 26 m west, and Glaciofluvial deposits (Devensian) are also recorded 41 m east and 164 m south-east.

Bedrock

The 1:10,000 scale published geology indicates there is Marsden Formation underlying the site. Fletcher Bank Grit is recorded 53 m west, Upper Kinderscout Grit is recorded 65 m east. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 5-2. Figure 5-1 presents bedrock formations up to 250 m from the site; beyond the 250 m buffer no bedrock information is included in this report.

Table 5-2 - Plevins site compound - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional details
Marsden Formation	0 m	on-site	Mudstone and siltstone
Fletcher Bank Grit	53 m	west	Sandstone
Upper Kinderscout Grit	65 m	east	Sandstone

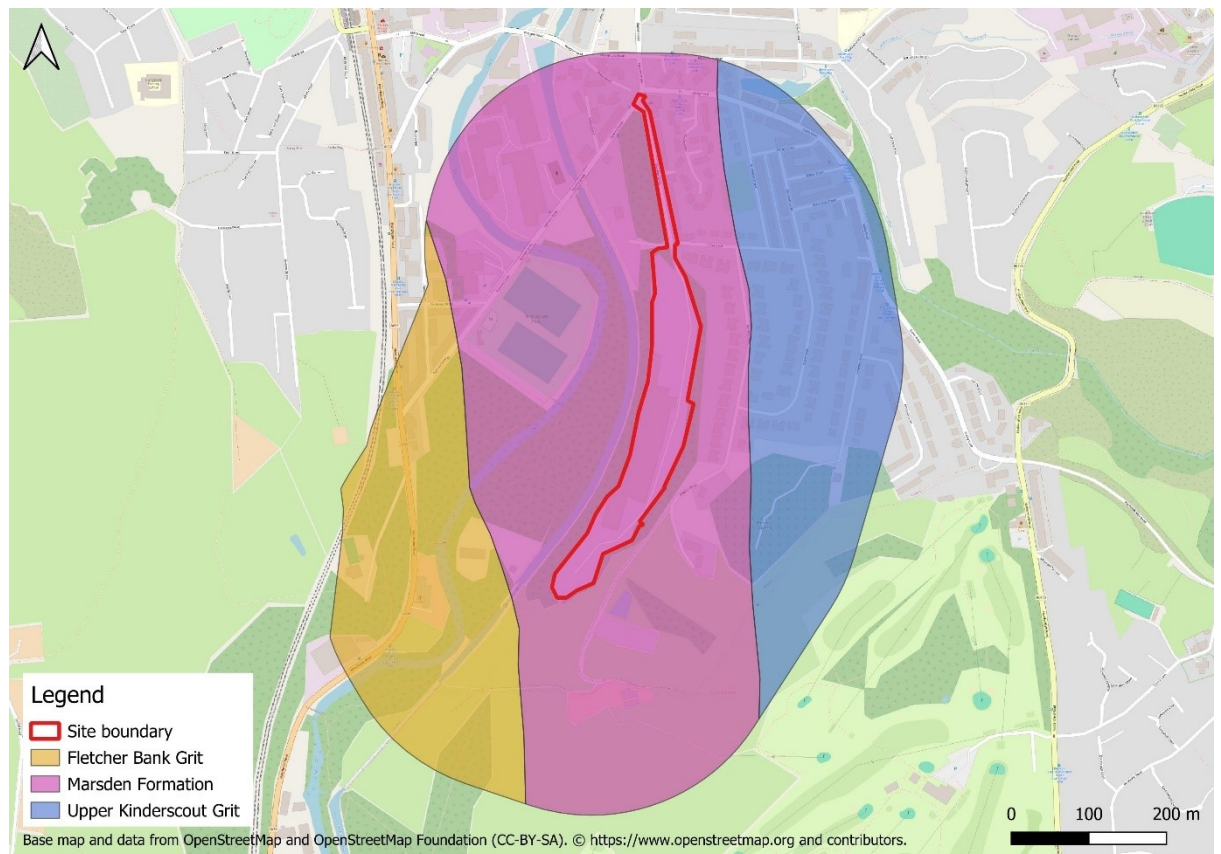


Figure 5-1 - Scout west laydown area and ramp access - Bedrock geology

Faults and linear features

The 1:10,000 scale published geology indicates there is one linear feature, fossil horizon, located 240 m south-west of the site.

5.3 Hydrogeology

Superficial aquifers

The data from Groundsure¹³ indicates that there is a secondary (Undifferentiated) superficial aquifer underlying the site, associated with the Devensian Till.

Secondary (Undifferentiated) aquifers are defined by the Environment Agency as “where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designed as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.”

Bedrock aquifers

The data from Groundsure¹³ indicates the presence of a secondary A bedrock aquifer underlying the site, associated with the Marsden Formation.

Secondary A aquifers are defined as “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.”

Groundwater vulnerability

Groundsure¹³ data indicates that the groundwater vulnerability is high for the bedrock aquifer and medium for the superficial aquifer. A high classification is assigned to areas which are “able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.” A medium classification is assigned to areas which are an “intermediate between high and low vulnerability.”

Groundwater source protection zones

The data from Groundsure¹³ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹³ indicates that there is one historical groundwater abstraction within 250 m of the site. A “spring fed catchpit at Kershaw Hey Farm, Mossley” located 199 m south, started 08/02/1966. No expiry date has been provided by Groundsure.

Groundwater discharge consents

The data from Groundsure¹³ indicates there are no groundwater discharge consents within 250 m of the site.

5.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹³ as Huddersfield Narrow Canal west section. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 5-3.

Table 5-3 - Plevins site compound - Surface watercourses

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Huddersfield narrow canal west section	Canal	22 m	west	Moderate

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Tame (Chew Brook to Swineshaw Brook)	River	34 m	north	Moderate
Willow Lake	Lake	34 m	south-east	-
Unnamed watercourse	On ground surface watercourse	44 m	south-east	-
Unnamed watercourse	On ground surface watercourse	97 m	west	-
Unnamed watercourse	On ground surface watercourse	194 m	west	-

Surface water discharge consents

The data from Groundsure¹³ indicates there are no licensed discharges to surface water on-site. There are two licensed discharges within 250 m of the site. In addition, there are no pollutant release to surface waters on-site or within 250 m of the site. A summary of surface water discharge consents within 250 m is provided in Table 5-4.

Table 5-4 - Plevins site compound - Surface water discharge consents

Permit number	Address	Receiving water	Distance from site boundary	Direction from site boundary	Effective date
01TAM0092	Crowhill, SSO, Stockport, Greater Manchester	Coastal Trib for DA 68/69	59 m	west	15/09/1993
01TAM0088	Manchester road CSO, Manchester Road, Mossley, Ashton-under-lyne, Greater Manchester, OL5 9LZ	River Tame	157 m	west	11/01/2017

Surface water abstractions

The data from Groundsure¹³ indicates there are no surface water abstractions within 250 m of the site.

5.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹³ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

5.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹³ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 5-5.

Table 5-5 - Plevins site compound - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is located within a coal mining area.
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There is one other brit pit within 250 m of the site. This is located 156 m south-east, a surface mineral working for sandstone, which at date of entry has ceased to extract minerals.
Surface Ground Workings	There is one surface ground workings feature on-site. There are 23 other surface ground workings features within 250 m of the site. Details are provided in Table 5-6.

Category	Summary
Underground Workings	There are no underground workings on-site. There is one other underground workings within 250 m of the site, a tunnel located 182 m south-west.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 5-6 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 5-6 - Plevins site compound - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Unspecified Heap	0 m	west	1992
Canal	13 m	west	1906-1992
Bricks Works	14 m	west	1891
Unspecified Ground Workings	20 m	east	1907
Lake	21 m	south-east	1892-1992
Refuse Heap	28 m	north-west	1906-1956
Unspecified Ground Workings	44 m	north-west	1938
Sand Pit	49 m	north-west	1907
Cemetery	52 m	south-east	1872-1992
Refuse Heap	83 m	north-west	1906-1923
Pond	124 m	east	1872-1970
Sand Pit	132 m	south-east	1907-1923
Refuse Heap	139 m	west	1906-1907
Unspecified Pit	148 m	south-east	1956
Canal	149 m	south-west	1899
Unspecified Ground Workings	152 m	south-west	1956
Sand Pit	154 m	south-east	1906-1938
Unspecified Ground Workings	167 m	east	1872
Refuse Heap	175 m	west	1923-1992
Tunnel	182 m	south-west	1899-1992

Name	Distance from site boundary	Direction from site boundary	Date
Unspecified Heap	188 m	west	1956
Cuttings	189 m	south-west	1899-1992
Refuse Heap	196 m	south-east	1956
Unspecified Old Quarry	206 m	south-west	1899-1933

The Mining Remediation Authority⁵ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹³ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 5-7. However, not all licence details have not been provided by Groundsure.

Table 5-7 - Plevins site compound - Landfill and waste summary

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary	Licence issue date	Licence status
Historical Landfill	-	Inert, Commercial, Household	105 m	west	11/04/1985	Surrendered: 28/04/1994
Licensed Waste Sites	Cheshire Street, Mossley, Ashton Under Lyne, Lancashire, OL5 9ng	Household, Commercial & Industrial Waste T Stn	0 m	on-site	16/07/2004	Issued
Waste Exemptions	Palletman & Sons Ltd, Land Off, Cheshire Street, Mossley, OL5 9NW	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising	8 m	north-east	-	-

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary	Licence issue date	Licence status
Waste Exemptions	Unit 6 Glover Estate Egmont Street, Mossley, Ashton Under Lyne, OL5 9PY	Burning waste in the open	162 m	west		

5.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

5.8 Sensitive land uses

The data from Groundsure¹³ indicates there is one site of special scientific interest (SSSI) within 250 m, the Huddersfield Narrow Canal. There are no other sensitive land uses, including Ramsar or areas of conservation within 250 m of the site. The site is located within a SSSI impact zone.

5.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are three pollution incidents reported by Groundsure¹³ within 250 m of the site and a summary has been provided in Table 5-8.

Table 5-8 - Plevins site compound - Pollution incidents

Type	Distance from site boundary	Direction from site boundary	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Other pollutant	78 m	east	Category 2 (significant)	Category 4 (no impact)	Category 4 (no impact)	28/04/2010

Type	Distance from site boundary	Direction from site boundary	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Atmospheric pollutants and effects	89 m	south-east	Category 3 (minor)	Category 4 (no impact)	Category 4 (no impact)	04/03/2003
Sewage materials	236 m	west	Category 4 (no impact)	Category 3 (minor)	Category 3 (minor)	04/04/2001

Pollution prevention and controls

The data from Groundsure¹³ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. A summary of the number and location of these applications has been provided in Table 5-9.

Table 5-9 - Plevins site compound - Pollution controls overview

Pollution prevention and control category	Summary
Pollution inventory substances	There are no pollution inventory substances on-site or within 250 m of the site.
Licensed pollutant release (Part A(2)/B)	There are no licensed pollutant release part A2 and B features on-site. There are three licensed pollutant release part A2 and B features within 250 m of the site.
Historical licensed industrial activities	There are no historical licensed industrial activities on-site or within 250 m of the site.
Licensed industrial activities (Part A(1))	There are no licensed industrial activities on-site or within 250 m of the site.

Further detail of pollution prevention and controls on-site and within 250 m are given in Table 5-10.

Table 5-10 - Plevins site compound - Pollution prevention and controls detailed summary

Type	Site	Description	Distance from site boundary	Direction from site boundary	Status
Licensed pollutant release (part a(2)/b)	Metal Brite Anticorrosive Services, Audley Street	Historical Permit Part B	44 m	west	Historical permit

Licensed pollutant release (part a(2)/b)	Northern Electrical Connectors, Egmont Street	Historical Permit Part B	145 m	west	Historical permit
Licensed pollutant release (part a(2)/b)	R Etchells & Sons, Egmont Street	Historical Permit Part B	187 m	west	Historical permit

Planning hazardous substance consents

The data from Groundsure¹³ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹³ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹³ indicates there are five recent industrial land uses on-site. There are 21 recent industrial land uses within 250 m of the site. A summary has been provided in Table 5-11.

Table 5-11 - Plevins site compound - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Electricity substation	Infrastructure and facilities	Electrical features	0 m	on-site
Plevin	Foodstuffs	Fish, Meat and Poultry Products	0 m	on-site
Tank	Industrial Features	Tanks (Generic)	0 m	on-site
Travelling crane	Industrial features	Travelling cranes and gantries	0 m	on-site
Works	Industrial Features	Unspecified Works Or Factories	0 m	on-site
Gas governor station	Infrastructure and facilities	Gas features	6 m	north-west
Palletman & Sons	Industrial products	Packaging	38 m	north-west

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Electricity substation	Infrastructure and facilities	Electrical features	57 m	east
Works	Industrial Features	Unspecified Works Or Factories	82 m	north-west
Works	Industrial Features	Unspecified Works Or Factories	122 m	south-west
Electricity substation	Infrastructure and facilities	Electrical features	127 m	west
Airtec Air Systems Ltd.	Engineering services	Industrial engineers	145 m	west
Mobile Pallets Ltd.	Industrial products	Packaging	147 m	west
Electricity substation	Infrastructure and facilities	Electrical features	150 m	west
Benchmaster	Industrial Products	Tools Including Machine Shops	155 m	west
J A S Engineering	Industrial products	Tools including machine shops	161 m	west
N E C Engineering	Industrial products	Metals manufacturers, fabricators and stockholders	162 m	west
Gladiator Foam Ltd.	Consumer products	Bathroom fixtures, fittings and sanitary equipment	163 m	west
Greenbridge Engineering Ltd.	Engineering services	Precision engineers	163 m	west
UK Workbenches	Industrial products	Tools including machine shops	163 m	west
P S Contract Furniture	Consumer products	Carpets, flooring, rugs and soft furnishings	190 m	west
T J Dobson Ltd	Industrial products	Access equipment	209 m	south-west
Works	Industrial Features	Unspecified Works Or Factories	228 m	west
A U T	Industrial products	Special purpose machinery and equipment	232 m	west
Revolution Castors Ltd.	Industrial products	Special purpose machinery and equipment	232 m	west

Electricity substation	Infrastructure and facilities	Electrical features	245 m	east
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Active and current petrol stations

There are no active or current petrol stations within 250 m of the site as indicated by Groundsure¹³.

Contaminated land designations

According to Groundsure¹³, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

5.10 Site area reconnaissance

A site walkover was undertaken on 03 June 2025 by two AtkinsRéalisis Environmental Scientists. A summary of the observations made during the visit is provided as follows.

Table 5-12 - Plevins site compound – Site walkover record

Item	Description
Location	<p>The site is located on third party land off Crown Hill in Mossley, Ashton-under-Lyne. The site is off-track with national grid reference SD 97768 01683 and What3Words of durations.branded.skip.</p> <p>The site is accessed via a locked metal gate, accessible through prior arrangement with Bruton Knowles. The compound covers an area of 2.6 ha. The site is surrounded by residential and commercial properties, with Huddersfield Narrow Canal being adjacent to the west of the site.</p>
Description of current use/activities	The site is currently derelict and unused.
Fuel/chemical storage	There was no visible fuel or chemical storage. Chemical hazard signs suggest that fuel/chemicals were stored on-site at some point.
Evidence of land contamination	<p>A slight oil sheen was observed near the entrance to the site, potentially in relation to damaged lorry used to block access gates. There were also “soap-like” bubbles surrounding one of the drains on-site.</p> <p>Buildings were not accessible during the visit, however asbestos warning signs and chemical hazard signs were noted around the site.</p>

	A variety of piles of potential Made Ground, rubble, sawdust and unknown waste stockpiles were noted around the site.
Invasive Species	No invasive species were identified.
Surface coverage	Flat concrete slopes down to entrance in north. Cobbled road from entrance to main area. Gravelled area to west of access. Hardstanding cracked and missing along south-east boundary.
Boundary Types	Dense vegetation and palisade fencing around site.
Surface Water Features	There are no surface water features on-site.

5.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site and future use of the site as a construction compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:

- Coal depot;
 - Electricity substation; and
 - Micklehurst goods station.
- Off-site:
 - Historical land uses surrounding the site including:
 - Chemical works;
 - Cotton Mills;
 - Woolen Mills;
 - Gas Governors;
 - Tanks;
 - Cemetery;
 - Iron/Bronze Foundry;
 - Electricity substations;
 - Refuse heaps; and
 - Garages.
 - Current land uses surrounding the site including:
 - Electricity substations;
 - Tanks;
 - Engineering works; and
 - Factories.
- Historical landfill [105 m west].
- Pollution incidents [78 m east, 89 m south-east, 236 m west].

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Bedrock secondary (A) aquifer; and
 - Superficial secondary (Undifferentiated) aquifer.
 - Surface water:
 - Huddersfield Narrow Canal west section [22 m west];
 - River Tame [34 m north];
 - Willow Lake [34 m south-east]; and

- Unnamed watercourses [44 m south-east, 97 m west, 194 m west].
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater;
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:

- Ground gas migration and build up within confined spaces; and
- potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 5-13 - Plevins site compound - Initial Conceptual Site Model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following on-site sources:</p> <p>Made Ground associated with former developments on-site:</p> <p>Coal depot;</p> <p>Electricity substation; and</p> <p>Micklehurst goods station.</p> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>On-site:</u></p> <p><u>Human Health</u></p> <p>–</p> <p>Construction workers</p> <p>Future users of the site.</p> <p><u>Property</u> –</p> <p>Compound related facilities</p> <p><u>Off-site:</u></p> <p><u>Human Health</u></p> <p>– Residents and occupiers of commercial/ industrial premises, users of public open spaces.</p> <p><u>Property and Services</u> –</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site.</p> <p>During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. It is also unlikely that significant excavation will take place on-site as the area is already in use as a storage compound and additional use will include temporary welfare/ offices. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The site is unlikely to be used after construction of the railway is complete and it is assumed that the site will be reinstated to its original condition.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
<p><i>Petroleum hydrocarbons</i></p> <p><i>PCBs</i></p> <p><i>Volatile organic compounds (VOCs)</i></p> <p><i>Ground gases (methane, carbon dioxide, hydrogen</i></p>	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p>	<p>Commercial businesses and residential properties</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Made Ground is present on the site, which may be a source of ground gas.</p> <p>Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site.</p>

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sulphide or carbon monoxide)					Welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.
	Inhalation of asbestos fibres.		Low	Severe	<p>Moderate risk</p> <p>Former buildings on-site increase the likelihood of asbestos being present from demolition of these structures. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk.</p> <p>The majority of the site, while in use as a compound, will be covered in hardstanding or gravel therefore it is unlikely that contact with the Made Ground or infilled ground will occur. Some of the site is already in use as a storage compound, underlain by gravel. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches.	Groundwater Controlled Waters – Bedrock secondary A aquifer Superficial secondary (Undifferentiated) aquifer	Low	Medium	<p>Moderate/low risk</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site.</p> <p>Made Ground and superficial deposits are recorded underling the entire site, decreasing the potential migration of contaminants to bedrock over the majority of the site.</p> <p>As the site is being used as a storage compound, it is possible that new services (i.e. drainage) being installed for potential welfare cabins will create new preferential pathways.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater</p>

					<p>vulnerability is classed as high for the bedrock aquifer and medium for the superficial aquifer. If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.</p>	<p><u>Surface Water</u> <u>Controlled</u> <u>Waters</u> – River Tame Huddersfield Narrow Canal west section Unnamed watercourses</p>	Low	Medium	<p>Moderate/low risk Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to the surface waters located on-site. The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the west, towards the River Tame. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater. As the site may include welfare cabins and therefore require services (i.e. drainage), there is potential for the works to create preferential pathways to the controlled waters.</p>
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:</p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil derived dust.</p>	<p><u>On-site:</u> <u>Human Health</u> – Construction workers <u>Property</u> –</p>	Unlikely	Medium	<p>Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately</p>

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Historical land uses surrounding the site including: Chemical works; Cotton Mills; Woolen Mills; Gas Governors; Tanks; Cemetery; Iron/Bronze Foundry; Electricity substations; Refuse heaps; and Garages. Current land uses surrounding the site including: Electricity substations; Tanks; Engineering works; and Factories. Historical landfill: 105 m west Pollution incidents: 78 m east; 89 m south-east; 236 m west.		Compound related facilities			off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. There are numerous sources of contamination located on the western side of the River Tame and the canal and therefore are unlikely to reach the site. There are some sources located close to the site which have the potential to migrate to the site, via hydraulic gradient. Superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. One historical groundwater abstraction is recorded within 250 m of the site. Furthermore, no private water supplies are recorded within 250 m of the site.
<i>Possible contaminants include: Asbestos Metals</i>					

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PAHs Petroleum hydrocarbons VOCs PCBs Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	Low	Medium	Moderate/low risk A historical landfill located 105 m west of the site could be a potential source of ground gas. However, due to the proximity of the historical landfill, migration to the site is unlikely. It is also located on the western side of the River Tame, further mitigating the potential for migration. No coal seams are located within 250 m of the site.
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5.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

6. BASELINE FOR SCOUT EAST ACCESS WORK

6.1 Site history

Table 6-1 provides a summary of the historical development at the Scout East site and the surrounding 250 m buffer area. The history of the site and surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure¹³.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 6-1 – Scout East Access work- Summary of historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1891-1992	0 m	on-site
Railway sidings	1891-1938	0 m	on-site
Allotment gardens	1954-1984	0 m	on-site
Reservoir (infilled)	1892-1909	1 m	east
Tunnel	1892-1992	7 m	east
Coal depot	1863	11 m	east
Goods shed	1906-1938	28 m	east
Railway building	1891	38 m	east
Goods shed	1907	53 m	east
Albert Mills	1863-1923	67 m	north-east
Garage	1954-1992	74 m	north-east
Scout Farm	1863-1992	100 m	south-west
Unspecified pit	1956	107 m	north-east
Unspecified pit	1891-1970	114 m	north-west
Garage	1975-1996	124 m	east
Refuse heap	1906-1992	126 m	east
Quarry	1863	139 m	north-west

¹³ Groundsure 2024, Enviro + Geo Insight (GS-UNX-42W-14K-IF9).

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified mill	1892-1992	139 m	south
Unspecified ground workings	1938	153 m	east
Unspecified mills	1891-1938	153 m	north-east
Unspecified tank	1954-1955	154 m	west
Unspecified heap	1933	155 m	east
Unspecified mill	1907	156 m	south-east
Unspecified ground workings	1891-1956	157 m	north
Unspecified pit	1891-1938	160 m	north
Refuse heap	1918-1923	164 m	north
Gravel pit	1863	167 m	west
Refuse heap	1918-1938	168 m	north
Unspecified pit	1906-1970	171 m	north
Scout Mill	1845-1992	175 m	south
Unspecified ground workings	1956-1982	176 m	north-east
Unspecified tank	1906-1933	176 m	north-east
Refuse heap	1918-1938	180 m	north
Electricity substation	1984-1990	182 m	north
Unspecified tank	1894-1898	185 m	north-east
Ground workings and refuse heap	1907	186 m	north
Brick works	1892	188 m	south-west
Refuse heap	1907-1956	191 m	east
Unspecified mills	1891-1938	193 m	north-east
Unspecified tanks	1918-1923	196 m	east
Wire works	1970-1992	205 m	north-east
Refuse heap	1906-1956	209 m	east
Tanks	1918-1955	217 m	east
Tanks	1894-1938	236 m	north-east
Unspecified tank	1954-1955	236 m	south-east
Unspecified commercial/industrial	1863	238 m	north
Cotton mill	1863	247 m	north

6.2 Previous ground investigations

Description of the investigation

An intrusive ground investigation was undertaken by Structural Soils Ltd. In February 2018¹⁴ around Mossley Station, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Two of the locations are within 250 m of the site and have been summarised in Table 6-2 and the investigation locations are displayed in Figure 6-1.

Table 6-2 - Scout East Access work - Summary of investigation

Item	No. undertaken
Number of boreholes	Two Automatic Ballast Sampler boreholes
Number of trial pits	None
PID* testing undertaken	None
Number of soil samples tested	Two
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	

¹⁴ Structural Soils 2018, TransPennine Route Upgrade Factual Report on Ground Investigation (151667-TSA-05-MVL3-DM3-X-MF-700013).



Figure 6-1 – Scout East Access work - Previous ground investigations

Chemical analysis of environmental samples collected during investigations was scheduled by Structural Soils Ltd. and tested by EnviroLab. Table 6-3 summaries the soil samples analysed for selected determinants from within 250 m of the site.

Table 6-3 - Scout East Access work - Testing suite

Determinand/suite	Number of samples tested
Metals/Metalloids (antimony, arsenic, beryllium, boron (water soluble), cadmium, chromium (total) copper, lead, mercury, nickel, selenium, vanadium and zinc).	2
Speciated polycyclic aromatic hydrocarbons (USEPA 16) (PAH)**, total PAHs-16MS.	2
BTEX (benzene, toluene, ethylbenzene, m and p xylene and o xylene) and Methyl Tert Butyl Ether (MTBE).	0
Speciated total petroleum hydrocarbons (TPH) criteria working group (CWG) with aliphatic/aromatic separation and carbon banding,	2
Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs).	0

Determinand/suite	Number of samples tested
Asbestos screen.	2
Soil Organic Matter (SOM).	0
Speciated PCB-EC7	2

Ground conditions

Table 6-4 summarises the ground conditions encountered during the ground investigation.

Table 6-4 - Scout East Access work - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Light grey gravel of course grained igneous rock (diorite) (Clean ballast)	0.20 (start of borehole below rail line).	0.75 - 0.90
	Light to dark grey sandy gravel of course igneous rock (diorite). Sand. (Dirty ballast)		
	Dark grey to black very sandy gravel of dolomitic limestone and diorite. Sand of ash and coal. (Very dirty ballast).		
	Light to dark grey and pink slightly sandy grained gravel of fine-grained igneous rock and medium grained igneous rock (granite) (Clean ballast)		
	Some sand of ash and coal (Dirty ballast)		
Sand	Light and dark brown slightly gravelly slightly clayey sand with coast gravel sized pockets of clay.	0.75	1.20

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic materials is displayed in Table 6-5.

Table 6-5 - Scout East Access work - Summary of anthropogenic material observed

Exploratory Hole	Depth (m)	Comment	Strata
AB2011	0.65 – 0.90	Ash inclusions	Made Ground
AB2012	0.70 – 0.75	Ash inclusions	

6.3 Published geology

A summary of the published geology relevant to the Scout East Access site is provided below. The data has been sourced from Groundsure¹⁴ and the British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicated that Made Ground is not recorded over the majority of the site. Made Ground is recorded along the eastern boundary. Made Ground is mapped within 250 m of the site, 198 m north, and 215 m north-east.

Superficial deposits

The 1:10,000 scale published geology maps indicate there are no superficial geology designations recorded on-site. There are three superficial geology designations recorded within 250 m of the site. Glaciofluvial sheet deposits (Devensian) are found 58 m north-west, Alluvium is found 94 m east and Head deposits are found 120 m west.

Bedrock

The 1:10,000 scale published geology dataset indicates there are two bedrock geology designations on-site. There are two other bedrock geology designations within 250 m of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 6-6. Figure 6-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is including in this report.

Table 6-6 - Scout East Access work - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional Details
Fletcher Bank Grit	0 m	on-site	Sandstone
Marsden Formation	0 m	on-site	Mudstone And Siltstone
Marsden Formation	100 m 130 m	east west	Mudstone And Siltstone
Huddersfield White Rock	105 m	west	Sandstone
Rossendale Formation	138 m	west	Mudstone And Siltstone



Figure 6-2 - Scout East Access work - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is one linear feature on-site. There are three other linear features within 250 m of the site. Details are provided in Table 6-7 and can be seen in Figure 6-2.

Table 6-7 – Scout East Access work - Summary of bedrock faults

Data source	Description	Distance from the site boundary	Direction from the site boundary
Fossil horizon	Fossil horizon, marine band	0 m	on-site
Fossil horizon	Fossil horizon, marine band	6 m	west
Rock	Coal seam	131 m	west
Fossil horizon	Fossil horizon, marine band inferred coincident with bedrock geology boundary	139 m	west

6.4 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁴ indicates that there are no superficial aquifers on-site. Secondary A superficial aquifers are located 85 m north-west and 123 m south-east. The Environment Agency describes a secondary A aquifer as:

“Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

Bedrock aquifers

The data from Groundsure¹⁴ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure¹⁴ data indicates that the groundwater vulnerability is high for the bedrock aquifer vulnerability. A high vulnerability classification is assigned to “areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.”

Groundwater source protection zones

The data from Groundsure¹⁴ and MAGIC website⁴ both indicate that the site is not within 250 m of the site.

Groundwater abstractions

The data from Groundsure¹⁴ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁴ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

6.5 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹⁴ as an unnamed watercourse located 79 m south-east of the site. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 6-8.

Table 6-8 - Scout East Access work - Surface watercourses

Name of Watercourse	Type	Distance from Site	Direction from Site	WFD Overall Classification
Unnamed watercourse	On ground surface	79 m	south-east	-
Unnamed watercourse	On ground surface	126 m	west	-
Tame (Chew Brook to Swineshaw Brook)	River	135 m	east	Moderate
Unnamed watercourse	On ground surface	191 m	north-east	-

Surface water discharge consents

The data from Groundsure¹⁴ indicates there are no licensed discharges to surface water features on-site. There are three licensed discharges to surface water features within 250 m of the site. In addition, there are no pollutant releases to surface water features on-site or within 250 m of the site. A summary of all surface water discharge consents within 250 m of the site has been provided in Table 6-9.

Table 6-9 - Scout East Access work - Surface water discharge consents

Permit number	Effluent Type	Address	Receiving water	Distance from site	Direction from site	Effective date
01TAM0088	Sewage discharges – sewer storm overflow – water company	Manchester Road CSO, Manchester Road, Mossley, Ashton-Under-Lyne, Greater Manchester, OL5 9LZ	Culvert to River	47 m	north	01/01/1995, revoked 02/09/2010
			Unnamed watercourse via Culvert	47 m	north	03/09/2010, revoked 10/01/2017
			River Tame	128 m	south-east	11/01/2017, present

Surface water abstractions

The data from Groundsure¹⁴ indicates there are no surface water abstractions within 250 m of the site.

6.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁴ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

6.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁴ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 6-10.

Table 6-10 - Scout East Access work - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	Published geology recorded one coal seam within 250 m of the site. This is located 130 m west.
Coal mining areas	The site is within a coal mining area.
Non-coal mining features	<p>There is one non-coal mining area on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.</p> <p>There are no other non-coal mining areas within 250 m of the site.</p>
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There are two brit pits within 250 m of the site. One is for the surface extraction of sand [45 m east] and the other for sandstone [189 m north-west]. Both at date of entry, have ceased to extract minerals.
Surface ground workings	There are two surface ground workings feature on-site. There are 20 other surface ground workings features within 250 m of the site. Details are provided in Table 6-11.
Underground workings	<p>There are no underground workings on-site.</p> <p>There is one underground working within 250 m of the site. The working is for the construction of Scout Tunnel and is located 7 m east of the site.</p>
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 6-11 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 6-11 - Scout East Access work - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1923-1992
Disused Reservoirs	0 m	on-site	1907
Tunnel	7 m	east	1907-1992
Cuttings	8 m	east	1891
Disused Reservoirs	8 m	west	1906-1918
Reservoir	78 m	south-west	1906-1992

Name	Distance from site	Direction from site	Date
Unspecified Pit	114 m	north-west	1891-1970
Refuse Heap	126 m	east	1906-1992
Sand Pit	133 m	east	1907
Unspecified Pit	134 m	north-west	1907
Unspecified Heap	155 m	east	1933-1938
Refuse heap	157 m	north	1891-1956
Gravel Pit	167 m	west	1863
Unspecified Pit	171 m	north	1923-1938
Unspecified Ground Workings	176 m	north-east	1906-1982
Refuse Heap	180 m	north	1907-1970
Brick Works	188 m	south-west	1892
Refuse Heap	191 m	east	1923
Unspecified Ground Workings	191 m	south-east	1956
Refuse Heap	209 m	east	1906-1923
Canal	231 m	south-east	1907
Pond	247 m	north	1863

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁴ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 6-12. There are currently no active or licensed waste sites within 250 m of the site.

Table 6-12 - Scout East Access work - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
Historical landfill	Land Off Egmont Street / Manchester Road	Inert, commercial, household	64 m	east	11/04/1985	Surrendered 28/04/1994
Waste exemptions	Murphy Compound, Huddersfield Road, Mossley, Manchester, OL5 9QN	Use of waste in construction	219 m	south	-	-

6.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

6.9 Sensitive land uses

The data from Groundsure¹⁴ indicates there are no sensitive land uses, including sites of special scientific interest (SSSI), Ramsar sites, or areas of conservation, within 250 m of the site. The site is located within a SSSI impact zone.

6.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There is one pollution incident reported by Groundsure¹⁴ within 250 m of the site and a summary has been provided in Table 6-13.

Table 6-13 - Scout East Access work - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Sewage materials – crude sewage	245 m	north-east	Category 4 (no impact)	Category 3 (minor)	Category 3 (minor)	04/04/2001

Pollution prevention and controls

The data from Groundsure¹⁴ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. A summary of the number and location of these applications has been provided in Table 6-14.

Table 6-14 - Scout East Access work - Pollution controls overview

Pollution prevention and control category	Summary
Pollution inventory substances	There are no pollution inventory substances on-site or within 250 m of the site.
Licensed pollutant release (part 2A/B)	There are no licensed pollutant release part 2A and B features on-site. There are two licensed pollutant release part 2A and B features within 250 m of the site, details of which are provided in Table 6-15 below.
Historical licensed industrial activities	There are no historical licensed industrial activities on-site or within 250 m of the site.
Licensed industrial activities (part A(1))	There are no licensed industrial activities on-site or within 250 m of the site.

Further detail of pollution prevention and controls on-site and within 250 m are given in Table 6-15.

Table 6-15 - Scout East Access work - Pollution prevention and controls detailed summary

Site	Description	Distance from site	Direction from site	Status
Chicago Coating Company Limited, Weir Mill, Manchester Road, Mossley,	Coating Processes	182 m	north	Historical permit (Part B)

Site	Description	Distance from site	Direction from site	Status
Tameside, OL5 9QA				
Express Metal Finishers (Oldham) Limited, New Scout Mill, Manchester Road, Mossley, Ashton-Under-Lyne, Tameside, OL5 5QW	Surface Cleaning	243 m	south	Historical permit (Part B)

Planning hazardous substance consents

The data from Groundsure¹⁴ indicates there are no Control of Major Accident Hazards (COMAH) sites or planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁴ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁴ indicates there are no recent industrial land uses on-site. There are 10 recent industrial land uses within 250 m of the site. A summary is provided in Table 6-16.

Table 6-16 - Scout East Access work - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
Mast (Telecommunication)	Infrastructure and facilities	Telecommunications features	39 m	east
Telephone Exchange	Infrastructure and facilities	Telecommunications features	90 m	north-east
Hancock Plastics Ltd	Industrial products	Rubber, silicones and plastics	116 m	north
A U T	Industrial products	Special purpose machinery and equipment	142 m	north-east
Revolution Castors Ltd	Industrial products	Special purpose machinery and equipment	142 m	north-east

Site	Industrial land use category	Description	Distance from site	Direction from site
Electricity Substation	Infrastructure and facilities	Electrical features	181 m	north
Victory Parade Dresses	Consumer products	Clothing, components and accessories	191 m	north
Irwell Motors	Motoring	Secondhand vehicles	219 m	south
Works	Industrial features	Unspecified works or factories	242 m	north-east
T J Dobson Ltd	Industrial products	Access equipment	246 m	north-east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure¹⁴.

Contaminated land designations

According to Groundsure¹⁴, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990, on-site or within 250 m of the site.

6.11 Site area reconnaissance

A site walkover was undertaken on 23 October 2024 by two AtkinsRéalis environmental scientists. A summary of the observations made during the visit is provided as follows.

Table 6-17 – Scout East Access work - Site walkover record

Item	Description
Current use and status of the site	Vacant land with access track – part of site used by general public to access other fields
General condition of site and surrounding land use	Immediately adjacent to track in west of site are horse paddocks and private garden with pond Residential housing to north and west of the site Railway line to the east

Item	Description
	Farm buildings/barn to south (potentially vacant)
Presence of visual contamination, Made Ground, surface staining and odours	No olfactory/visual evidence of contamination
Topography and surface condition – open ground, hardstanding and other geotechnical or surface features	Steep gradient down from west to railway in east. 95% vegetation cover. Access track – mud/gravel
Local surface water features	Pond adjacent to west of site
Presence and type of vegetation	Very heavily vegetated – grass, weeds, trees, bushes etc.
Signs of any vegetation dieback	No
Presence and extent of any non-native invasive plants such as Himalayan Balsam, New Zealand Pigmy weed or Giant Hogweed	No
Buildings and below or above ground structures such as fuel tanks	No buildings on-site
Above and likely below ground services	No above or below ground services
Access to and security of the site	Access not granted at time of walkover so used public right of way (PROW). Pedestrian access is available to west of site. Gate with padlock preventing vehicle access at west of site. Further internal fencing and gates are present across site to enter fields further east and south
Presence of any potential off-site receptors	Residential, ecology in pond
Potential presence of any asbestos cement material within buildings or throughout the site	No asbestos cement material present
Communications or discussions with site personnel	No communications or discussions with site personnel

6.12 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources

of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of the existing site use and future uses of the site as a construction access point and storage area. It is assumed the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of the available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site
 - Historical on-site uses including:
 - Allotment gardens.
- Off-site
 - Historical features surrounding the site including:
 - Infilled reservoir;
 - Coal depot;
 - Tunnel;
 - Railway building;
 - Garages;
 - Albert Mills;
 - Cotton Mills;
 - Refuse heaps;
 - Scout Mill;
 - Unspecified tanks; and

- Electricity substations.
- Current features surrounding the site including:
 - Industrial products;
 - Electricity substations;
 - Motor products; and
 - Consumer products.
- Historical landfill:
 - Inert, commercial and household [64 m east].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space use and during construction works:

- Human Health
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Resident and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.

- Controlled Waters
 - Groundwater:
 - Bedrock secondary A aquifer; and
 - Secondary A superficial aquifer
 - Surface water:
 - Unnamed watercourses; and
 - River Tame.
- Property and Services
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground and landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);

- migration of groundwater to the River Tame;
- migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
- surface water run-off.
- Property and Services
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 6-18 - Scout East Access work - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following on-site sources:</p> <p>Historical on-site uses including: Allotment gardens; Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p>On-site: <u>Human Health</u> – Construction workers Future users of the site</p> <p>Property – Compound related facilities</p> <p>Off-site: <u>Human Health</u> – Resident and occupiers of commercial/ industrial premises, use of public open space areas.</p>	<p>Unlikely</p>	<p>Medium</p>	<p>Low Risk Based on the site history and recent land use, there is a potential for contaminants to be present in soil and groundwater on-site.</p> <p>The site will be utilised as a compound for construction access and storage, so it is assumed that the area will be hardstanding or gravel cover, reducing the amount of possible contact with contaminants. It is unlikely that there will be a need to break ground on-site when utilised as the compound.</p> <p>It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
	<p>Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).</p>	<p><u>Property and Services</u> – Commercial businesses and residential properties.</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk Made Ground and infilled ground are anticipated to be present on the site, which may be a source of ground gas. There is no Made Ground indicated on BGS mapping, however the presence of an infilled reservoir suggests some may be present. The degree of risk of ground gas being present is dependent on the composition and thickness of the Made Ground found.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					<p>Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site.</p> <p>Welfare cabins, if present as part of the compound set-up, are likely to have a void between the floor and ground therefore the ingress of gas is unlikely.</p>
	Inhalation of asbestos fibres.		Unlikely	Severe	<p>Moderate/low risk</p> <p>There are no previous buildings on-site which may have been subject to demolition that could be a source of asbestos.</p> <p>There is potential for users of the site to come into contact with soil due to the site's temporary use as an access point. The access route is likely to be gravelled or tarmac therefore would reduce the potential for exposure to Made Ground as well as, hardstanding may be present within the compound area.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock.	<u>Groundwater</u> <u>Controlled</u> <u>Waters</u> Bedrock secondary A Superficial secondary A aquifer	Low	Medium	<p>Moderate/low risk</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.				<p>If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the bedrock aquifer. As there are no superficial deposits found on-site to limit potential migration, leachable contaminants will be able to migrate from Made Ground directly into bedrock. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p> <p>There are no foundations proposed however new drainage may be installed if cabins are proposed on the compound area set up, therefore there is potential for new migration pathways to be created, increasing the risk to the site for migration.</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – River Tame (Source to Chew Brook). Unnamed watercourses	Low	Medium	<p>Low Risk</p> <p>Due to the distance between the site and the surface water bodies, it is unlikely that leachable contaminants will migrate to surface waters. The hydraulic gradient is assumed to be towards the south-east, towards the River Tame. The majority of the potential off-site source of contamination are located down gradient from the site, therefore potential contaminants are unlikely to migrate towards the site.</p>
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	On-site: <u>Human Health</u> – Construction workers	Low	Medium	<p>Moderate/low risk</p> <p>Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. Once construction is complete, the site will become public open space, therefore it is possible that</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Historical features surrounding the site including: Infilled reservoir; Coal depot; Tunnel; Railway buildings; Garages; Albert Mills; Cotton Mills; Refuse heaps; Scout Mill; Unspecified tanks; and Electricity substations. Current features surrounding the site including: Industrial products; Electricity substations; Motor products; and Consumer products. Historical landfill: Inert, commercial and household [64 m east].	Inhalation of airborne asbestos fibres.	Future users of the site <u>Property –</u> Compound related facilities	Unlikely	Severe	people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted. Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. The surrounding area is most likely covered in vegetation or soil therefore there is a potential exposure to Made Ground whereby contaminants could migrate to the site through windblown dust.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Any superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.
<i>Possible contaminants include:</i>	Migration of gases into confined spaces/buildings and accumulation (explosion).		Low	Medium	Moderate/low risk A historical landfill is located within 100 m of the site, which could be a potential source of gas. Due to the age of the landfill it is unlikely that the site would still be generating gas at a significant rate that could have a negative impact on the site.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation of ground gas (asphyxiation).				One coal seam is located 131 m west of the site. Due to the distance from the site, any potential ground gas is unlikely to migrate to the site.

6.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

7. BASELINE FOR SCOUT EAST LAYDOWN AREA AND RAMP ACCESS

7.1 Site history

Table 7-1 provides a summary of the historical development at the Scout East site and the surrounding 250 m buffer area. The history of the site and surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure¹⁴.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 7-1 - Scout east laydown area and ramp access - Summary of historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Coal depot	1863-1894	0 m	on-site
Cuttings	1891-1992	0 m	on-site
Railways sidings	1891-1938	0 m	on-site
Goods shed	1906- 1938	0 m	on-site
Tunnel	1892-1992	3 m	west
Goods shed	1907	9 m	east
Albert Mill (cotton)	1863	40 m	east
Garage	1954-1990	45 m	north
Unspecified mills	1906-1923	53 m	east
Garage	1975-1992	64 m	north-east
Refuse heap	1906- 1956	82 m	east
Garage	1975-1996	101 m	east
Refuse heap	1906-1992	102 m	east
Sand pit	1907	111 m	east
Unspecified ground workings	1891-1970	117 m	north-west
Scout mill (cotton)	1845-1992	122 m	south
Refuse heap	1907-1956	123 m	east
Unspecified pit	1891-1907	123 m	north-west
Unspecified mills	1891-1938	124 m	north-east

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Feature	Date	Distance from site boundary	Direction from site boundary
Refuse heap	1918-1938	135 m	north
Unspecified mill	1907	136 m	south-east
Tanks	1918-1923	141 m	south-east
Sand pit	1907	142 m	east
Quarry	1863	144 m	north-west
Refuse heap	1906-1956	144 m	east
Unspecified tank	1909-1933	146 m	north-east
Unspecified ground workings	1891-1982	147 m	north
Refuse heap	1918-1938	151 m	north
Unspecified tank	1894-1923	153 m	north-east
Unspecified tanks	1918-1933	155 m	south-east
Tanks	1922-1955	159 m	south-east
Unspecified mills	1891-1938	166 m	north-east
Unspecified ground workings	1956	171 m	south-east
Unspecified tanks	1938	172 m	south-east
Unspecified mill	1918	175 m	east
Wire works	1956	175 m	north-east
Unspecified tank	1954-1992	178 m	west
Unspecified tank	1938-1955	186 m	south-east
Electricity substation	1984-1990	190 m	north-west
Brick works	1892	201 m	south-west
Ground Workings and Refuse Heap	1906-1970	202 m	north-west
Refuse heap	1918-1923	205 m	east
Tanks	1909	205 m	north-east
Tanks	1894-1909	209 m	north-east
Unspecified commercial/industrial buildings	1863	213 m	north
Cotton mill	1863	220 m	north

7.2 Previous ground investigations

Description of investigation

An intrusive ground investigation was undertaken by Structural Soils Ltd. in February 2018¹⁵ around Mossley Station, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Three of the locations are within 250 m of the site and have been summarised in Table 7-2 and the investigation locations are displayed in Figure 7-1.

Table 7-2 - Scout east laydown area and ramp access - Summary of investigation

Item	No. undertaken
Number of boreholes	Three Automatic Ballast Sampler boreholes
Number of trial pits	None
PID* testing undertaken	None
Number of soil samples tested	Two
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	



Figure 7-1 - Previous investigations

Chemical analysis of environmental samples collected during investigations was scheduled by Structural Soils Ltd. and tested by EnviroLab. Table 7-3 summarises the soil samples analysed for selected determinants from within 250 m of the site.

Table 7-3 - Scout east laydown area and ramp access - Testing suite

Determinand/suite	Number of samples tested
Metals/Metalloids (antimony, arsenic, beryllium, boron (water soluble), cadmium, chromium (total) copper, lead, mercury, nickel, selenium, vanadium and zinc).	2
Speciated polycyclic aromatic hydrocarbons (USEPA 16) (PAH)**, total PAHs-16MS.	2
BTEX (benzene, toluene, ethylbenzene, m and p xylene and o xylene) and Methyl Tert Butyl Ether (MTBE).	0
Speciated total petroleum hydrocarbons (TPH) criteria working group (CWG) with aliphatic/aromatic separation and carbon banding,	2

Determinand/suite	Number of samples tested
Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs).	0
Asbestos screen.	2
Soil Organic Matter (SOM).	0
Speciated PCB-EC7	2

Ground conditions

Table 7-4 summarises the ground conditions encountered during the ground investigation.

Table 7-4 - Scout east laydown area and ramp access - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Light grey gravel of course grained igneous rock (diorite) (Clean ballast)	0.20 (start of borehole below rail line).	0.75 - 0.90
	Light to dark grey sandy gravel of course igneous rock (diorite). Sand. (Dirty ballast)		
	Dark grey to black very sandy gravel of dolomitic limestone and diorite. Sand of ash and coal. (Very dirty ballast).		
	Light to dark grey and pink slightly sandy grained gravel of fine grained igneous rock and medium grained igneous rock (granite) (Clean ballast)		
	Some sand of ash and coal (Dirty ballast)		
	Light to dark grey slightly sandy angular to subangular fine to		

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
	coarse gravel of coarse grained igneous rock (diorite). (Clean ballast)		
	Dark brown to black sandy slightly clayey angular to subangular fine to coarse gravel of igneous rock, limestone including ash and coal (Dirty ballast).		
Sand	Light and dark brown slightly gravelly slightly clayey sand with coarse gravel sized pockets of clay.	0.75	1.20

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic materials is displayed in Table 7-5.

Table 7-5 - Scout east laydown area and ramp access - Summary of anthropogenic materials observed within the logs

Exploratory Hole	Depth (m)	Comment	Strata
AB2011	0.65 – 0.90	Ash inclusions	Made Ground
AB2012	0.70 – 0.75	Ash inclusions	

7.3 Published geology

A summary of the published geology relevant to the Scout East Laydown Area and Ramp Access site is provided below. The data has been sourced from Groundsure¹⁴ and the British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not recorded across the majority of the site, however is mapped as

encroaching on the western boundary. Made Ground is mapped within 250 m of the site. Made Ground may be associated with the railway track and previous historical developments surrounding the site.

Superficial deposits

The 1:10,000 scale published geology maps indicate there are no superficial deposits on-site. There are three superficial designations within 250 m of the site. Alluvium is recorded 31 m east, Glaciofluvial sheet deposits (Devensian) are recorded 156 m west and Head deposits are recorded 187 m west.

Bedrock

The 1:10,000 scale published geology maps indicate there is one bedrock geology designation on-site. There are five other bedrock designations within 250 m of the site. A summary is provided in Table 7-6. Figure 7-2 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 7-6 - Scout east laydown area and ramp access - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional Details
Fletcher Bank Grit	0 m	on-site	Sandstone
Marsden Formation	27 m	west	Mudstone And Siltstone
	78 m	east	
	201 m	west	
Huddersfield White Rock	165 m	west	Sandstone
Rossendale Formation	208 m	west	Mudstone And Siltstone

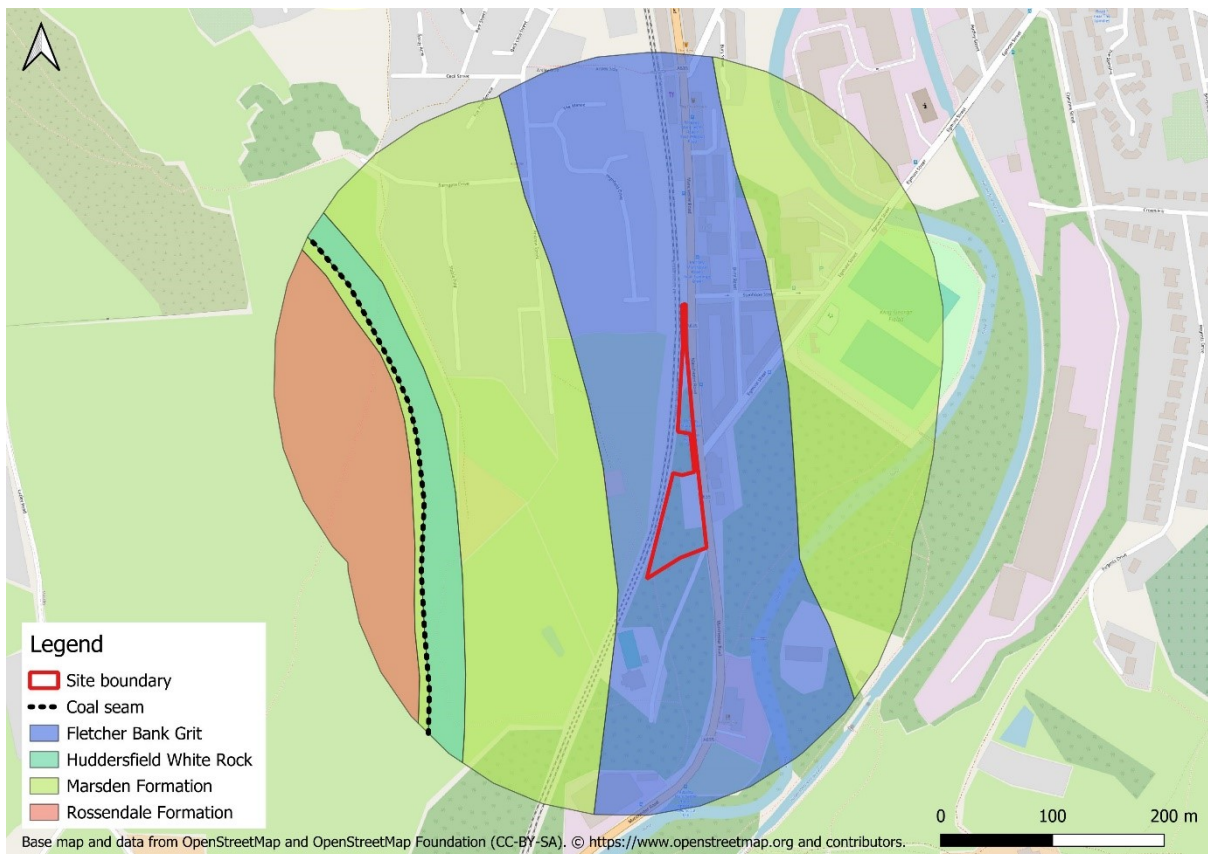


Figure 7-2 – Scout east laydown area and ramp access - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are no linear features recorded on-site. There are four other linear features within 250 m of the site. Details are provided in Table 7-7 and can be seen in Figure 7-2.

Table 7-7 - Scout east laydown area and ramp access - Summary of bedrock faults

Data source	Description	Distance from the site boundary	Direction from the site boundary
Fossil horizon	Fossil horizon, marine band	97 m	west
Fossil horizon	Fossil horizon, marine band	110 m	west
Rock	Coal seam	201 m	west
Fossil horizon	Fossil horizon, marine band inferred coincident	214 m	west

Data source	Description	Distance from the site boundary	Direction from the site boundary
	with bedrock geology boundary		

7.4 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁴ indicates there are no superficial aquifers on-site. Secondary A superficial aquifers are located 28 m east and 158 m north-west. The Environment Agency describes a secondary A aquifer as:

“Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”.

Bedrock aquifers

The data from Groundsure¹⁴ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure¹⁴ data indicates that the groundwater vulnerability is high for the bedrock aquifer. A high vulnerability classification is assigned to “Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits”.

Groundwater source protection zones

The data from Groundsure¹⁴ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹⁴ indicates there are no groundwater abstractions within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁴ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

7.5 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹⁴ as an unnamed watercourse and is located 59 m south-east of the site. A summary of all surface water courses (rivers, lakes, canals and coastal and transitional waters) within 250 m of the site has been provided in Table 7-8.

Table 7-8 - Scout east laydown area and ramp access - Surface water courses

Name of Watercourse	Type	Distance from Site	Direction from Site	WFD Overall Classification
Unnamed watercourse	On ground surface watercourse	59 m	south	-
Tame (Chew brook to Swineshaw brook)	River	77 m	south-east	Moderate
Unnamed watercourse	On ground surface watercourse	146 m	west	-
Unnamed watercourse	On ground surface watercourse	162 m	north-east	-
Huddersfield Narrow Canal west section	Canal	200 m	east	-

Surface water discharge consents

The data from Groundsure¹⁴ indicates there are no licensed discharge to surface water features on-site. There are three licensed discharge to surface water features within 250 m of the site. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site. A summary of all surface water discharge consents within 250 m have been provided in Table 7-9.

Table 7-9 - Scout east laydown area and ramp access - Surface water discharge consents

Permit number	Effluent Type	Address	Receiving water	Distance from site	Direction from site	Effective date
01TAM0088	Sewage discharges – sewer	Manchester Road CSO, Manchester	Culvert to River	19 m	north	01/01/1995, revoked 02/09/2010

Permit number	Effluent Type	Address	Receiving water	Distance from site	Direction from site	Effective date
	storm overflow – water company	Road, Mossley, Ashton-Under-Lyne, Greater Manchester, OL5 9LZ	Unnamed watercourse via Culvert	19 m	north	03/09/2010, revoked 10/01/2017
			River Tame	86 m	south-east	11/01/2017, present

Surface water abstractions

The data from Groundsure¹⁴ indicates there are no surface water abstractions within 250 m of the site.

7.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁴ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

7.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁴ records coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 7-10.

Table 7-10 - Scout east laydown area and ramp access - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	Published geology maps record one coal seam within 250 m of the site. This is located 201 m west.
Coal mining areas	The site is within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. Potential for difficult

Category	Summary
	ground conditions are unlikely and are at a level where they need not be considered.
	There are no other non-coal mining areas within 250 m of the site.
British pits (active or closed surface and underground mineral workings)	There is one brit pit on-site. There is one other brit pit within 250 m of the site. This is located 187 m north-west. Both at date of entry, have ceased to extract minerals.
Surface ground workings	There is one surface ground workings features on-site. There are 20 other surface ground workings features within 250 m of the site. Details are provided in Table 7-11.
Underground workings	There are no underground workings on-site. There is one underground working within 250 m of the site, associated with Scout Tunnel and is located Table 7-11.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 7-11 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 7-11 - Scout east laydown area and ramp access - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1891-1992
Tunnel	3 m	west	1892-present
Disused reservoirs	65 m	west	1907
Refuse heap	82 m	east	1933-1956
Disused reservoirs	84 m	west	1906-1918
Reservoir	98 m	south-west	1906-1992
Refuse heap	102 m	east	1906-1956
Sand pit	111 m	east	1907
Unspecified ground workings	117 m	north-west	1891-1970
Refuse heap	123 m	east	1923-1992
Refuse heap	138 m	north	1918-1923

Name	Distance from site	Direction from site	Date
Refuse heap	144 m	east	1906-1907
Refuse heap	149 m	north-west	1891-1982
Unspecified ground workings	171 m	south-east	1956
Unspecified pit	171 m	north-west	1923-1938
Canal	184 m	south-east	1907
Unspecified pit	195 m	north-west	1906-1938
Brick works	201 m	south-west	1892
Unspecified pit	204 m	north-west	1907-1970
Refuse heap	205 m	east	1923
Pond	220 m	north	1863

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high development risk area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁴ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites have been provided in Table 7-12. There are currently no active or licensed waste sites within 250 m of the site.

Table 7-12 - Scout east laydown area and ramp access - Landfill and waste summary

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
Historical Landfill	Land Off Egmont Street, Manchester Road	Inert, Commercial, Household	15 m	east	11/04/1985	Surrendered Active: 05/10/1986 – 31/12/1988
Waste Exemptions	Murphy Compound, Huddersfield Road, Mossley, Manchester, OL5 9QN	Use of waste in construction	207 m	south	-	-

7.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

7.9 Sensitive land uses

The data from Groundsure¹⁴ there is a Site of Special Scientific Interest (SSSI), the Huddersfield Narrow Canal located 200 m east of the site. There are no Ramsar sites, areas of conservation or special protection areas within 250 m of the site. The site is located within a SSSI impact zone.

7.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There is one pollution incident reported by Groundsure¹⁴ within 250 m of the site and a summary has been provided in Table 7-13.

Table 7-13 - Scout east laydown area and ramp access - Pollution incidents

Type	Distance from site	Direction from site	Category of Incident: Air	Category of Incident: Land	Category of Incident: Water	Date of Incident
Sewage materials	214 m	north-east	Category 4 (no impact)	Category 3 (minor)	Category 3 (minor)	04/04/2001

Pollution prevention and controls

The data from Groundsure¹⁴ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. There are two licensed pollutant release part 2(A) features within 250 m of the site. A summary is provided in Table 7-14.

Table 7-14 - Scout east laydown area and ramp access - Pollution prevention and controls summary

Type	Site	Description	Distance from site	Direction from site	Status
Licensed pollutant release (part a(2)/b)	Chicago Coating Company Ltd.	Part B (historical permit)	155 m	north	Historical permit
Licensed pollutant release (part a(2)/b)	Express Metal Finishers (Oldham)	Part B (historical permit)	208 m	south	Historical permit

Planning hazardous substance consents

The data from Groundsure¹⁴ indicates there are no hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁴ indicates there are no radioactive substance authorisation features within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁴ indicates there is one recent industrial use on-site. There are nine recent industrial land uses within 250 m of the site. A summary has been provided in Table 7-15.

Table 7-15 - Scout east laydown area and ramp access - Contemporary trade directory

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Mast (telecommunication)	Infrastructure and facilities	Telecommunications features	0 m	on-site
Telephone exchange	Infrastructure and facilities	Telecommunications features	63 m	east
Hancock plastics ltd	Industrial products	Rubber, silicones and plastics	87 m	north
A U T	Industrial products	Special purpose machinery and equipment	115 m	east

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Revolution castors Ltd	Industrial products	Special purpose machinery and equipment	115 m	east
Victory parade dresses	Consumer products	Clothing, components and accessories	167 m	north
Electricity substation	Infrastructure and facilities	Electrical features	198 m	north-west
Irwell motors	Motoring	Secondhand vehicles	207 m	south
Works	Industrial features	Unspecified works or factories	212 m	north-east
T j dobson Ltd	Industrial products	Access equipment	216 m	north-east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site as indicated by Groundsure¹⁴.

Contaminated land designations

According to Groundsure¹⁴, there are no sites designated as contaminated land on-site or within 250 m of the site under Part 2A of the Environmental Protection Act 1990.

7.11 Site area reconnaissance

A site walkover was undertaken on 17 March 2025 by an AtkinsRéalis environmental scientist. A summary of the observations made during the visit is provided as follows.

Table 7-16 – Scout east laydown area and ramp access - Site walkover record

Item	Description
Location	<p>The site is located on third-party land in Mossley, Greater Manchester. The site is off-track with national grid reference SD 97400 01565 and What3Words miracle.harmony.redeeming (northern parcel) and SD 97405 01469 and What3Words gazes.mediate.whiplash (southern parcel).</p> <p>Access was not granted at time of survey, so observations were made from PRow.</p>

Item	Description
Description of current use/ activities	The site appears unused and vegetated. Small private car park currently located within the southern parcel.
Fuel/chemical storage	No evidence of fuel storage was observed.
Evidence of land contamination	No evidence of land contamination was observed.
Invasive Species	None observed from viewpoint.
Surface coverage	The site is predominantly made up of vegetated land. There is a hardstanding area within the southern parcel. The land is sloped away from the track, down towards the road.
Boundary Types	A retaining wall separates the site from Manchester Road. Some metal fencing is located surrounding the private car park. Trees line the wall along the boundary. Western boundary areas are not visible from viewpoint.
Surface Water Features	No surface water features were visible.

7.12 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and future use of the site as an access area and storage compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical on-site uses and Made Ground associated with the former developments including:
 - Goods shed; and
 - Coal depot.
- Off-site:
 - Historical features surrounding the site including:
 - Tunnel;
 - Railway track;
 - Albert Mill;
 - Goods shed;
 - Garages;
 - Unspecified mills;
 - Refuse heaps;
 - Scout Mill;
 - Tanks;
 - Quarries;
 - Wire works;
 - Brick works; and
 - Electricity substations.
 - Current features surrounding the site including:
 - Industrial product suppliers; and

- Vehicle sales.
- Historical landfills [15 m east].
- Pollution incident [214 m north-east].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health
 - On-site
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site
 - Residents and occupiers of commercial/industrial premises; and
 - Users of public open spaces.
- Controlled Waters
 - Groundwater
 - Secondary A bedrock aquifer; and
 - Secondary A superficial aquifers [28 m east, 158 m north-west].

- Surface water
 - Unnamed watercourses [59 m south, 146 m west, 162 m north-east];
 - River Tame [77 m south-east]; and
 - Huddersfield Narrow Canal west section [200 m west].
- Property and Services:
 - On-site
 - Construction compound buildings (offices, welfare, canteen, stores, etc.)
 - Off-site
 - Commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);

- migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
- migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
- surface water run-off.
- Property and Services
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires the potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 7-17 - Scout east laydown area and ramp access - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following on-site sources:</p> <p>Historical on-site uses and Made Ground associated with the former developments including:</p> <p>Goods shed; and Coal depot.</p> <p>Possible contaminants include:</p> <p><i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>On-site:</u> <u>Human Health</u> – Construction workers</p> <p><u>Property</u> – Compound related facilities</p> <p><u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, users of public open spaces.</p> <p><u>Property and Services</u> – Commercial businesses and residential properties</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site.</p> <p>During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. It is also unlikely that significant excavation will take place on-site as it will be used for temporary welfare/offices and access. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The site is unlikely to be used after construction of the railway is complete and it is assumed that the site will be reinstated to its original condition. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
<p><i>hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen</i></p>	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p>		<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Made Ground is not recorded on the site, however may still be present. which may be a source of ground gas.</p> <p>Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
sulphide or carbon monoxide)	Inhalation of asbestos fibres.		Low	Severe	<p>Welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.</p> <p>Moderate risk</p> <p>Former buildings on-site increase the likelihood of asbestos being present from demolition of these structures. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk.</p> <p>The majority of the site, while in use as a compound, will be covered in hardstanding or gravel therefore it is unlikely that contact with the Made Ground or infilled ground will occur.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer,	Groundwater Controlled Waters – Bedrock secondary A aquifer Superficial secondary A aquifers	Low	Medium	<p>Moderate/low risk</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site.</p> <p>Made Ground is recorded on the western boundary of the site, resulting in Made Ground directly overlaying bedrock, as superficial deposits are not found on-site, increasing the potential migration of contaminants to bedrock over the majority of the site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	proposed service pipes/trenches, piled foundations.				<p>As the site is being used as a storage compound, it is possible that new services (i.e. drainage) being installed for potential welfare cabins will create new preferential pathways.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer.</p> <p>If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – Unnamed watercourses, River Tame and Huddersfield Narrow Canal west section	Low	Medium	<p>Moderate/low risk</p> <p>Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to the surface waters located on-site.</p> <p>The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater.</p> <p>The hydraulic gradient is assumed to be towards the east, towards the River Tame. The majority of contaminative sources are to the east of the site, reducing the potential for contaminants to migrate towards the site.</p> <p>Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p> <p>As the site may include welfare cabins and therefore require services (i.e. drainage), there is potential for</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					the works to create preferential pathways to the controlled waters.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Tunnel; Railway track; Albert Mill; Goods shed; Garages; Unspecified mills; Refuse heaps; Scout Mill; Tanks; Quarries; Wire works; Brick works; and Electricity substations. Current features surrounding the site including: Industrial product suppliers; Vehicle suppliers. Historical landfill [15 m east]. Pollution incidents:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers <u>Property</u> – Compound related facilities	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Sewage materials [214 m north-east].					As there are numerous sources of contamination close to the site, there is potential for contaminants to migrate to the site, however limited due to the assumed direction of the hydraulic gradient.
<i>Possible contaminants include:</i>					There are no superficial deposits present between the Made Ground and bedrock to limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.
<i>Asbestos</i>					
<i>Metals</i>					
<i>PAHs</i>					
<i>Petroleum hydrocarbons</i>	Migration of gases into confined spaces/buildings and accumulation (explosion).		Low	Medium	Moderate/low risk
<i>VOCs</i>	Inhalation of ground gas (asphyxiation).				Historical landfills are located within 100 m of the site, which could be a potential source of ground gas. Due to the proximity of the historical landfill, migration to the site is possible. However, the eastern area of the landfill is underlain by cohesive superficial deposits and is upgradient from the River Tame, which will limit migration.
<i>PCBs</i>					There is one coal seam located 201 m west of the site.
<i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>					

7.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

8. BASELINE FOR ROUGHTOWN ROAD FOOTBRIDGE (MVL3/18)

8.1 Site history

Table 8-1 provides a summary of the historical development at the Roughtown Rd site and the surrounding 250 m buffer area. The history of the site and surrounding 250 m area has been determined principally by reference to historical maps obtained within Groundsure¹⁵.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages; were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 8-1 - Roughtown road footbridge (MVL3/18) - Summary of historical development

Feature	Date	Distance from the site boundary	Direction from the site boundary
Cuttings	1854-1992	0 m	on-site
Allotment gardens	1954-1990	0 m	on-site
Unspecified pit	1891-1982	7 m	south
Unspecified old quarry	1891-1938	15 m	south
Tramway	1909-1933	41 m	south-east
Unspecified tank	1891 - 1922	44 m	south
Sandstone quarry	1854	65 m	north-west
Unspecified old quarry	1891-1906	65 m	north
Refuse heap	1918-1938	81 m	north
Garage	1996	83 m	south-east
Unspecified pit	1956-1982	86 m	north
Electricity substation	1991-1996	97 m	north-west
Unspecified commercial/industrial	1891-1992	99 m	south-east
Unspecified pit	1956	101 m	north-west
Stanford Cotton Mill	1904-1982	114 m	south-east
Unspecific old quarry	1904-1982	116 m	north-east
Roughtown Cotton Mill	1904-1956	119 m	north-east
Mill Race (backfilled)	1904-1956	121 m	north-east
Dye works	1891-1938	121 m	north-west
Woodend Cotton Mills	1904-1982	121 m	south

¹⁵ Groundsure 2024, Enviro + Geo Insight (GS-5CT-L33-QZ4-RM7).

Feature	Date	Distance from the site boundary	Direction from the site boundary
Mill Race	1904-1982	121 m	south
Electricity substation	1954-1955	128 m	north-east
Carr Hill Cotton Mills	1891-1982	131 m	south
Unspecified old quarries	1904	131 m	south
Refuse heap	1956	134 m	south
Unspecified tank	1918-1923	139 m	north-east
Unspecified tank	1894	150 m	east
Unspecified commercial/industrial	1891-1992	153 m	south
Cuttings	1854-1918	155 m	south-west
Railway sidings	1923-1938	156 m	south-west
Tanks	1909-1933	161 m	north-west
Allotment gardens	1933-1992	164 m	west
Unspecified tank	1909-1922	175 m	south
Unspecified works	1982-1992	178 m	north-east
Tanks	1954-1955	179 m	north-west
Unspecified tank	1909-1933	186 m	west
Unspecified foundry	1906-1970	190 m	north-east
Carr Hill Quarry	1891-1982	202 m	west
Electricity substation	1954-1996	207 m	south
Bricks works	1891	211 m	east
Unspecified pit	1956	225 m	west
Bricks works	1891	245 m	south

8.2 Published geology

A summary of the published geology relevant to the Roughtown Road Footbridge (MVL3/18) site is provided below. The data has been sourced from Groundsure¹⁶ and the British Geological Society (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate there are no Made Ground features mapped on-site. Made Ground is recorded within 250 m of the site, the closest of which is located 85 m south-east. Made Ground may be associated with historical development including garages, cotton mills, quarries and unspecified tanks.

Superficial deposits

The 1:10,000 scale published geology maps indicate there are no superficial geology designations recorded on-site. Alluvium (clay, silt, sand and gravel) is recorded 83 m south-east of the site. Devensian Till is recorded 206 m east of the site.

Bedrock

The 1:10,000 scale published geology indicates there is one bedrock geology designation on-site. There are three other bedrock geology designations within 250 m of the site.

A summary of the bedrock geology mapped on-site and within 250 m of the site boundary is provided in Table 8-2. Figure 8-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer; no bedrock information is included in this report.

Table 8-2 - Roughtown road footbridge (MVL3/18) - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional details
Upper Kinderscout Grit	0 m	on-site	Sandstone
Hebden Formation	60 m	west	Mudstone and siltstone
Kinderscout Grit	137 m	south-east	Sandstone
Hebden Formation	160 m	south	Mudstone and siltstone

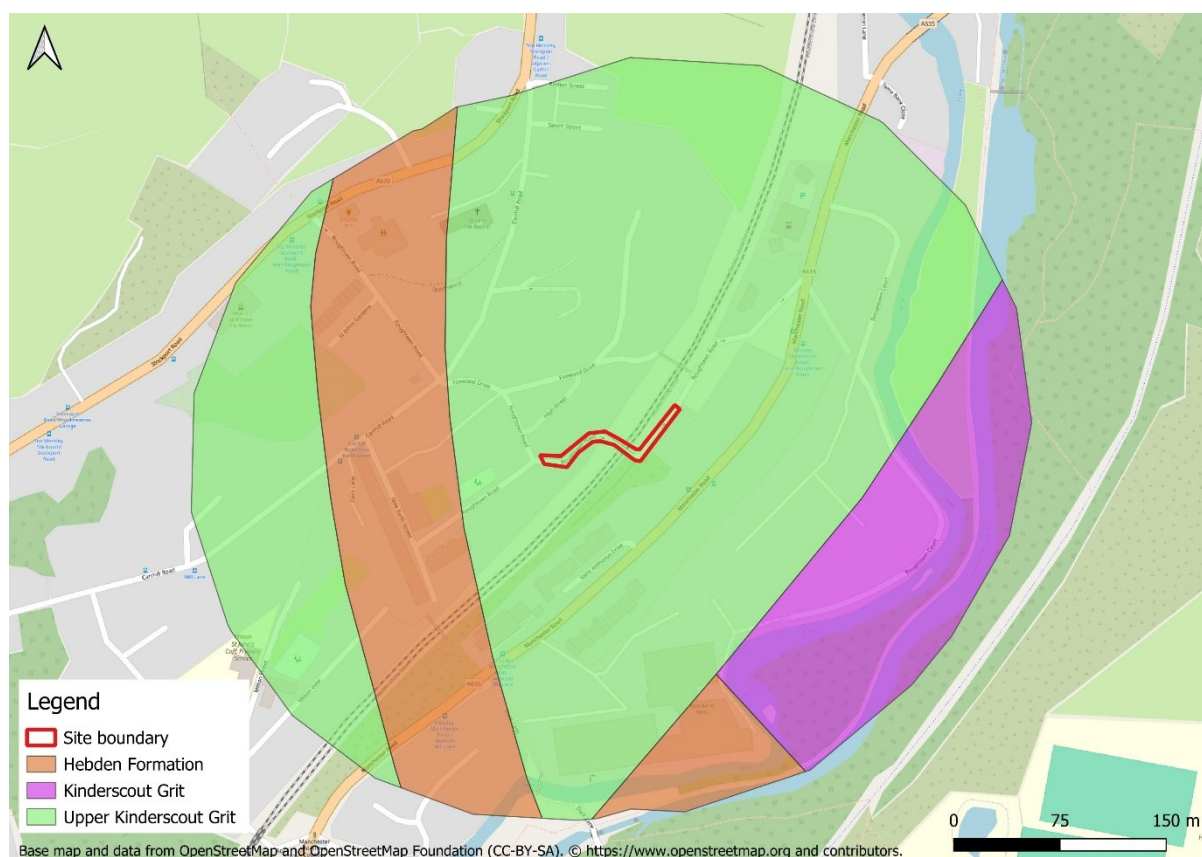


Figure 8-1 - Roughtown Road footbridge (MVL3/18) - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are no bedrock faults on-site. There are two other bedrock faults within 250 m of the site. A summary is provided in Table 8-3. Faults are visible in Figure 8-1.

Table 8-3 - Roughtown road footbridge (MVL3/18) - Summary of bedrock faults

Category	Description	Orientation	Distance from the site boundary	Direction from the site boundary
Fault	Normal fault, inferred	north-east to south-west	139 m	south-east
Fault	Normal fault, inferred	north-west to south-east	161 m	south-east

8.3 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁶ indicates that there are no designated superficial aquifers on-site. A secondary A aquifer is located 70 m east of the site, associated with the off-site Alluvium. The Environment Agency describes a secondary A aquifer as “*Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*”

There is also a secondary A aquifer located 182 m south-west of the site. A secondary (Undifferentiated) aquifer is located 217 m south of the site associated with the Till deposits. This classification is assigned by the Environmental Agency when “*it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.*”

Bedrock aquifers

The data from Groundsure¹⁶ indicates that the site and surrounding area is underlain by a secondary A aquifer, associated with Lower Kinderscout Grit.

Groundwater vulnerability

Groundsure¹⁶ data indicates that the groundwater vulnerability is high for the bedrock aquifer. This indicates that the site is located in an area easily able to transmit pollution to groundwater.

Groundwater source protection zones

The data from Groundsure¹⁶ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹⁶ indicates that there are no groundwater abstraction licenses on or within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁶ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

8.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹⁶ as the River Tame and is located 145 m east of the site. A summary of all surface

watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 8-4. There are a further two surface water features within 250 m of the site. There are a number of small tributaries to the River Tame located within 250 m of the site, all of which are located to the south-west of the river.

Table 8-4 - Roughtown road footbridge (MVL3/18) - Surface watercourses

Name of watercourse	Type	Distance from site	Direction from site	WFD overall classification
Tame (Chew Brook to Swineshaw Brook)	River	145 m	east	Moderate
Huddersfield Narrow Canal west section	Canal	210 m	east	Moderate

Surface water discharge consents

The data from Groundsure¹⁶ indicates there are no licensed discharges to surface water features on-site. There is one licensed discharge to surface water feature within 250 m of the site. A summary of which has been provided in Table 8-5. In addition, there are no pollutant releases to surface water features on-site or within 250 m of the site.

Table 8-5 - Roughtown road footbridge (MVL3/18) - Surface water discharge consents

Permit number	Address	Effluent Type	Receiving water	Distance from site	Direction from site	Effective date
01TAM0089 (Version 4)	Dark Lane CSO 441sh, Dark Lane, Mossley, Ashton Under Lyne, Greater Manchester, OL5 9AT	Sewer storm overflow – water company	River Tame	215 m	south	01/01/1995, revoked 02/09/2010 03/09/2010, revoked 04/02/2016 05/02/2016, revoked 31/03/2018 01/04/2018 to present

Surface water abstractions

The data from Groundsure¹⁶ indicates there are no surface water abstractions on or within 250 m of the site.

8.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁶ indicates that the maximum radon potential on the site is between 1-3%. The UK Radon Map⁵ indicated that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bg m⁻³.

8.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁶ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 8-6.

Table 8-6 - Roughtown road footbridge (MVL3/18) - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal mining areas	The site is located within a coal mining area as defined by the Coal Authority.
Non-coal mining features	There is one non-coal mining area identified on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There are two other brit pits within 250 m of the site. Both are surface mineral working, used for sandstone, however at date of entry, have ceased to extract minerals. They are located 53 m north and 244 m west.
Surface ground workings	There is one surface ground working feature on-site. There are 19 other surface ground workings features within 250 m of the site. Details are provided in Table 8-7.
Underground workings	There are no underground workings on-site or within 250 m of the site.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 8-7 provides further detail on the surface ground workings and the relative distance and direction from the site boundary.

Table 8-7 - Roughtown road footbridge (MVL3/18) - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1854-1992
Cuttings	1 m	north-west	1982-1992
Unspecified pit	7 m	south	1982-1970
Unspecified old quarries	15 m	south	1891-1938
Sandstone quarry	65 m	north-west	1891-1904
Refuse heap	81 m	north	1918-1938
Unspecified pit	86 m	north	1956-1982
Unspecified quarry	94 m	north-west	1930-1938
Unspecified pit	101 m	north-west	1930-1982
Unspecified old quarries	131 m	south	1904
Refuse heap	134 m	south	1956
Cuttings	155 m	south-west	1906-1918
Canal	201 m	east	1891-1992
Carr Hill Quarry	202 m	west	1891-1982
Bricks works	211 m	east	1891
Unspecified quarry	214 m	west	1904-1938
Pond	221 m	south	1938
Unspecified pit	225 m	west	1956
Unspecified quarry	228 m	west	1891
Unspecified old quarry	241 m	north	1930

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁶ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 8-8, however not all licence details have been provided by Groundsure.

Table 8-8 - Roughtown road footbridge (MVL3/18) - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
Historical landfill	Woodend Mills	Inert	151 m	east	24/01/1992	Surrendered (11/03/1993)
	Unit E310, Warmco	Storage of waste in a	56 m	east	-	-

Category	Site name or Address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
Waste exemptions	Industrial Park, Manchester Road, Mossley, OL5 9AY	secure place				
		Storage of waste in a secure place	104 m	south	-	-
		Recovery of scrap metal	166 m	south	-	-

8.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

8.8 Sensitive land uses

The data from Groundsure¹⁶ indicates that a site of special scientific interest (SSSI) is located 202 m east of the site. The SSSI is associated with the Huddersfield Narrow Canal. The site is also located within a SSSI impact zone. There are no other sensitive land uses, including Ramsar or areas of conservation within 250 m of the site.

8.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are three pollution incidents reported by Groundsure¹⁶ within 250 m of the site and a summary has been provided in Table 8-9.

Table 8-9 - Roughtown road footbridge (MVL3/18) - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Contaminated water	217 m	south	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	28/03/2002

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Contaminated water	220 m	south-east	Category 3 (minor)	Category 4 (no impact)	Category 1 (major)	12/06/2012
Pollutant not identified	223 m	south	Category 4 (no impact)	Category 4 (no impact)	Category 2 (significant)	17/10/2009

Pollution prevention and controls

The data from Groundsure¹⁶ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. A summary of the number and location of these applications has been provided in Table 8-10.

Table 8-10 - Roughtown road footbridge (MVL3/18) - Pollution controls overview

Pollution prevention and control category	Summary
Pollution inventory substances	There are no pollution inventory substances on-site or within 250 m of the site.
Licensed pollutant release (part 2A/B)	There are no licensed pollutant release part 2A and B features on-site. There is one licensed pollutant release part 2A and B features within 250 m of the site. This is located 240 m north-west, and details are provided in Table 8-11 below.
Historical licensed industrial activities	There are no historical licensed industrial activities on-site or within 250 m of the site.
Licensed industrial activities (part A(1))	There are no licensed industrial activities on-site or within 250 m of the site.

Further detail of pollution prevention and controls on-site and within 250 m are given in

Table 8-11.

Table 8-11 - Roughtown road footbridge (MVL3/18) - Pollution prevention and controls detailed summary

Site	Description	Distance from site	Direction from site	Status	Permit Type
Guide Bridge Service Station, Stockport Rd, OL5 0RS	Petrol vapour recovery	240 m	north-west	Historical permit	Part B

Planning hazardous substance consents

That data from Groundsure¹⁶ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁶ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁶ indicates there are no recent industrial land uses on-site. There are 19 recent industrial land uses within 250 m of the site. A summary has been provided in Table 8-12.

Table 8-12 - Roughtown road footbridge (MVL3/18) - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
George Sixsmith & Son Ltd	Consumer products	Musical instruments	72 m	north-west

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Site	Industrial land use category	Description	Distance from site	Direction from site
Electricity substation	Infrastructure and facilities	Electrical features	104 m	south-east
Broadbent Car & Commercial	Repair and servicing	Vehicle repair, testing and servicing	114 m	south-east
Notorious	Consumer products	Clothing, components and accessories	114 m	south-east
Electricity substation	Infrastructure and facilities	Electrical features	118 m	north-west
Industrial park	Industrial features	Business parks and industrial estates	120 m	south-east
D S Window Doors & Conservatories Ltd	Industrial products	General construction supplies	123 m	south-east
Geotron UK Ltd	Construction services	Cutting, drilling and welding services	123 m	south-east
K Broadbent Carpet Contractors	Construction services	Construction completion services	132 m	east
M D R Autos	Repair and servicing	Vehicle repair, testing and servicing	153 m	north-east
Myatt's of Mossley	Repair and servicing	Vehicle repair, testing and servicing	169 m	south
P N P	Engineering services	Electrical and electronic engineers	174 m	south-east
Hive Entertainment Ltd	Transport, storage and delivery	Distribution and haulage	184 m	south
Vertical Access Ltd	Engineering services	Civil engineers	186 m	south-east
Autofix	Repair and servicing	Vehicle repair, testing and servicing	195 m	south

Site	Industrial land use category	Description	Distance from site	Direction from site
Crescent Sheet Metal Company	Construction services	Metalworkers including blacksmiths	196 m	south
Victory Parade Dresses	Consumer products	Clothing, components and accessories	196 m	south
Electricity substation	Infrastructure and facilities	Electrical features	213 m	south
Chimney	Industrial features	Chimneys	221 m	south

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure¹⁶.

Contaminated land designations

According to Groundsure¹⁶, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

8.10 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationships.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and potential future uses following proposed reconstruction of the existing overbridge.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground relating to previous site use such as:
 - Allotment Gardens
- Off-site:
 - Historical features surrounding the site including:
 - Sandstone quarries, unspecified old quarries, Carr Hill Quarry (potentially infilled);
 - Refuse heaps, electricity substations, unspecified tanks, unspecified pits, unspecified foundry;
 - Stanford Cotton Mill, Roughtown Cotton Mill, Woodend Cotton Mills, Carr Hill Cotton Mill; and
 - Dye works.
 - Current features surrounding the site including:
 - Electrical features;
 - Vehicle repairs, testing and servicing;
 - Business parks and industrial estates;
 - Cutting, drilling and welding services;
 - Metal workers including blacksmiths; and
 - Chimneys.
 - Historical landfill: Woodend mills, inert [151 m east], licence surrendered 24/01/1992.

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and

- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Residents and occupiers of commercial/industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater: Bedrock secondary A aquifer.
 - Surface Water:
 - River Tame; and
 - Huddersfield Narrow Canal west section.
- Property and Services:
 - On-site: Structures (overbridge) and services; and
 - Off-site: Commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;

- ingestion of contaminated soils, soil-derived dust and groundwater;
- dermal contact with soil, soil-derived dust and groundwater; and
- inhalation of organic vapours (e.g. from fuel spills) and ground and landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the River Tame and the Huddersfield narrow canal west section;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 8-13 - Roughtown road footbridge (MVL3/18) - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Allotment gardens	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future users of the bridge	Unlikely	Medium	Low Risk Based on the limited development on-site historically, there is little potential for contaminants to be present in soil and groundwater on-site, although Made Ground may be present from development of the surrounding area. Future site users are unlikely to come into contact with soil as the site will be predominately covered by hardstanding. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>Volatile organic compounds (VOCs)</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Property and Services –</u> <u>Overbridge</u> <u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/industrial premises, Users of public open spaces.	Unlikely	Medium	Low Risk There are no viable ground gas sources identified on-site to date. There is the potential for limited Made Ground although this is not expected to be a significant gas source. The site does not require any confined or indoor spaces therefore accumulation of ground gas is unlikely. Future users of the site are likely to be present for short periods of time (use of the site as an overbridge) and are unlikely to be exposed to any potential ground gas for long periods of time.
	Inhalation of asbestos fibres.	<u>Property and Services –</u> Commercial businesses and residential properties.	Unlikely	Severe	Moderate/low risk As there are no former buildings on-site, the likelihood of asbestos being present is unlikely. The site is covered in hardstanding therefore it is unlikely that contact with any potential Made Ground will occur. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a

					<p>safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible.</p>
	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.</p>	<p><u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer</p>	Low	Medium	<p>Moderate/low risk</p> <p>The proposed development does not include the use of piled foundations, and any necessary excavations are unlikely to be deep enough to create new preferential pathways.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer.</p> <p>If Made Ground is present, there is potential for leaching of contaminants into groundwater in the bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p> <p>There are no superficial deposits found on-site that could limit migration of potential contaminants.</p>
	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.</p>	<p><u>Surface Water Controlled Waters</u> – River Tame Huddersfield Narrow Canal west section</p>	Low	Medium	<p>Moderate/low risk</p> <p>Due to the distance between the site and the surface water bodies, it is unlikely that leachable contaminants will migrate to surface waters.</p> <p>Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater.</p> <p>The hydraulic gradient is assumed to be towards the east, towards the River Tame.</p> <p>Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
Potential contaminants in	Inhalation, ingestion and dermal contact with	<u>Human Health</u> –	Unlikely	Medium	Low Risk

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soil/groundwater on-site, originating from the following <u>off-site</u> sources: Sandstone quarries, unspecified old quarries, Carr Hill Quarry; Refuse heaps, electricity substations, unspecified tanks, unspecified pits, unspecified foundry; Stanford Cotton Mill, Roughtown Cotton Mill, Woodend Cotton Mills, Carr Hill Cotton Mill; and Dye works. Current features surrounding the site including: Electrical features; Vehicle repairs, testing and servicing; Business parks and industrial estates; Cutting, drilling and welding services;	contaminants in soil derived dust.	Residents and occupiers of commercial/industrial premises, Users of public open spaces.			Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is possible for future site users to come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE, and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.	<u>Property and Services</u> – Commercial businesses and residential properties.	Low	Medium	Moderate/low risk Asbestos may have been present in former off-site structures/buildings that have now been demolished. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. The majority of the off-site contaminative land uses are to the east of the site. Therefore, any possible contaminants are likely to travel down hydraulic gradient towards the River Tame rather than towards the site. Off-site sources located to the west of the site, include the Dye Works, refuse heaps and unspecified quarries, will result in possible contaminants travelling under the site towards the river which could impact the secondary A bedrock aquifer.

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<p>Metal workers including blacksmiths; and Chimneys Historical landfill: Woodend Mills, inert [151 m east], licence surrendered 24/01/1992.</p>	Low	Medium	<p>Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.</p> <p>Moderate/low risk</p> <p>A historical landfill is located 150 m off the site, which could be a potential source of ground gas. However, the licence was surrendered in 1992, therefore it is unlikely that the site would still be producing gas at a high rate, or to a significant level that it would reach the site.</p> <p>The landfill is located to the east on the opposite side of the River Tame, further reducing the probability that gas would travel to the site.</p> <p>No coal seams are found around the site.</p> <p>There are no new service installations as part of the proposed development.</p>
<p><i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>			

8.11 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

9. BASELINE FOR RELOCATED MOSSLEY STATION WORKS

9.1 Site history

Table 9-1 provides a summary of the historical development at the new Mossley Station site and the surrounding 250 m buffer area. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure¹⁶.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 9-1 – Relocated Mossley Station works - Summary of the historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1854-1918	0 m	on-site
Railway Building	1863-1923	0 m	on-site
Railway Sidings	1891-1970	0 m	on-site
Carr Harr Mills	1891-1992	0 m	on-site
Unspecified Tank	1954-1955	0 m	on-site
Railway Station	1863-1992	1 m	west
Cotton Mills	1863	3 m	east
Railway Building	1891-1956	8 m	east
Garage	1954-1992	10 m	east
Electricity Substation	1954-1990	12 m	east
Unspecified Tank	1894-1933	19 m	west
Cotton Mill	1891-1970	21 m	east
Unspecified Ground Workings	1906-1982	24 m	north-west
Unspecified Mills	1891-1992	26 m	east
Electricity Substation	1954-1992	27 m	east
Refuse Heap	1906-1923	27 m	east

¹⁶ Groundsure 2024, Enviro + Geo Insight (GS-6UE-WWH-SLE-2AP)

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Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Mills	1891-1992	33 m	east
Unspecified Heap	1956	40 m	east
Unspecified Mills	1891-1992	42 m	east
Refuse Heap	1938	45 m	east
Cotton Mills	1854	47 m	east
Railway Sidings	1938	49 m	south-east
Quarry	1863	56 m	west
Unspecified Tank	1966	64 m	west
Unspecified Ground Workings	1956	66 m	east
Cotton Mill	1863	69 m	east
Unspecified Tank	1894-1955	72 m	north-east
Unspecified Ground Workings	1863-1992	73 m	west
Chimney	1970-1992	84 m	east
Refuse Heap	1956	95 m	east
Unspecified Mill	1891-1992	95 m	north-east
Unspecified Pit	1992	95 m	east
Unspecified Commercial/Industrial	1906-1992	102 m	east
Unspecified Tank	1923-1972	115 m	south-east
Unspecified Mills	1891-1982	129 m	east
Unspecified Commercial/Industrial	1992	132 m	east
Refuse Heap	1891-1938	136 m	west
Electricity Substation	1996	141 m	north-east
Refuse Heap	1906-1907	141 m	south-east
Refuse Heap	1906-1938	152 m	west
Unspecified Ground Workings	1906-1982	169 m	north-west
Unspecified Pit	1956	179 m	west
Electricity Substation	1909-1990	180 m	west

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Mill	1904-1992	180 m	west
Bricks Works	1891	182 m	east
Unspecified old quarries	1854-1904	183 m	north
Cotton Mill	1863-1992	184 m	east
Railway Sidings	1904-1938	192 m	west
Unspecified Mills	1904-1982	192 m	north-east
Unspecified Quarry	1891-1982	203 m	north
Electricity Substation	1909-1955	207 m	west
Refuse Heap	1956	207 m	north-east
Unspecified Heap	1863	210 m	west
Unspecified Tank	1872	212 m	east
Police Station	1863-1992	218 m	west
Garage	1954-1962	225 m	east
Electricity Substation	1909-1990	227 m	west
Unspecified Pit	1956	241 m	north
Electricity Substation	1990	243 m	west
Unspecified Tank	1909-1922	246 m	east
Quarry	1863	247 m	west

9.2 Previous ground investigations

Description of investigation

An intrusive ground investigation was undertaken by Structural Soils Ltd. in February 2018¹⁵ around Mossley Station, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. 11 of the locations are within 250 m of the site and have been summarised in Table 9-2 and the investigation locations are displayed in Figure 9-1.

Table 9-2 - Relocated Mossley Station works - Summary of 2018 investigation

Item	No. undertaken
Number of boreholes	11 Automatic Ballast Sampler boreholes

Number of trial pits	None
PID* testing undertaken	None
Number of soil samples tested	Five
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	

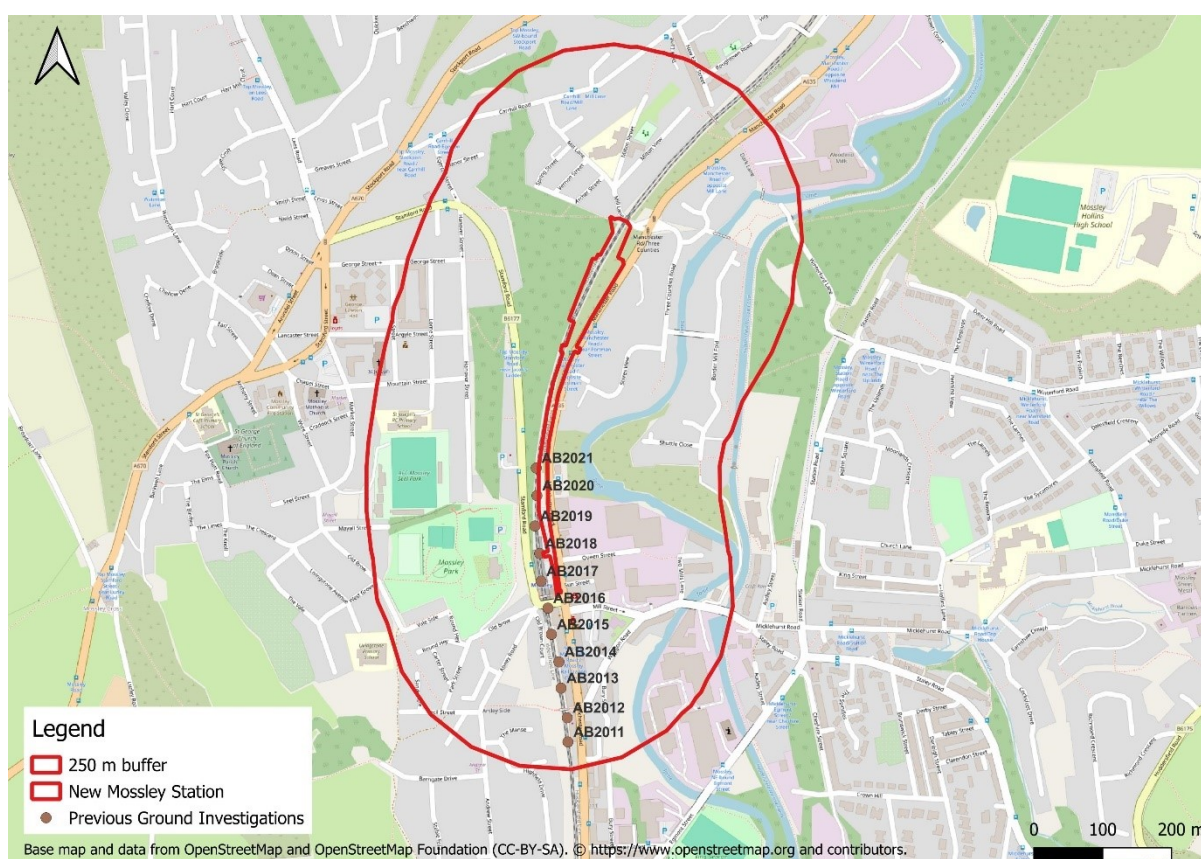


Figure 9-1 - Relocated Mossley Station works - Summary of investigations

Chemical analysis of environmental samples collected during investigations was scheduled by Structural Soils Ltd. and tested by EnviroLab. Table 9-3 summarises the soils samples analysed for selected determinants from within 250 m of the site.

Table 9-3 - Relocated Mossley Station works - Testing suites

Determinand/suite	Number of samples tested
Metals/Metalloids (antimony, arsenic, beryllium, boron (water soluble), cadmium, chromium (total) copper, lead, mercury, nickel, selenium, vanadium and zinc).	5
Speciated polycyclic aromatic hydrocarbons (USEPA 16) (PAH)**, total PAHs-16MS.	5
BTEX (benzene, toluene, ethylbenzene, m and p xylene and o xylene) and Methyl Tert Butyl Ether (MTBE).	0
Speciated total petroleum hydrocarbons (TPH) criteria working group (CWG) with aliphatic/aromatic separation and carbon banding,	5
Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs).	0
Asbestos screen.	5
Soil Organic Matter (SOM).	0
Speciated PCB-EC7	5

Ground conditions

Table 9-4 summarises the ground conditions encountered during the ground investigation.

Table 9-4 - Relocated Mossley Station works - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Pinkish and reddish dark brown to black gravel of granite. (Clean ballast)	0.20 (start of boreholes below rail line)	0.75 - 0.90
	Grey and dark brownish black sandy slightly gravel of granite and some brick and ash. (Very dirty ballast)		
	Light to dark grey gravel of igneous rock (Clean ballast)		

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
	Light grey and brown sandy slightly clayey gravel of granite (Dirty ballast)		
	Dark grey and brown to black sandy slightly clayey gravel of granite and sandstone.		
	Dark grey to black slightly sandy gravel of granite. (Clean ballast)		
	Dark grey to black very sandy gravel of granite including coal and ash. (Dirty ballast)		
	Light grey gravel of diorite (Clean ballast)		
	Brown and grey sandy clayey gravel of diorite, dolomitic limestone and granite. (Dirty ballast)		
Gravel	Dark grey and brown to black sandy slightly clayey gravel of granite and sandstone. Brown very sandy slightly clayey gravel of sandstone.	0.75 – 0.90	0.90 – 0.95
Sand	Light and dark brown slightly gravelly slightly gravelly slightly clayey fine to coarse sand with coarse gravel size pockets of clay. Gravel is subangular to subrounded of sandstone. Light brown slightly gravelly slightly clayey fine to coarse sand. Gravel is subrounded to rounded of sandstone.	0.70 - 0.75	0.85 - 1.20

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic materials is displayed in Table 9-5.

Table 9-5 - Relocated Mossley Station works - Summary of anthropogenic materials observed within the logs

Exploratory Hole	Depth (m)	Comment	Strata
AB2011	0.65 – 0.90	Ash inclusions.	Made Ground
AB2012	0.70 – 0.75	Ash inclusions.	
AB2016	0.65	Textile material	
AB2018	0.75 – 0.90	Brick fragments and ash inclusions. Geotextile material	
AB2020	0.45 – 0.80	Ash inclusions.	

9.3 **Published geology**

A summary of the published geology relevant to the Relocated Mossley Station site is provided below. The data has been sourced from Groundsure¹⁷ and British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not recorded on-site. Made Ground is also recorded 20 m east of the site, 43 m south-east and 109 m east. Made Ground may be associated with historical development on-site and in proximity to the site including unspecified mills, unspecified tanks and unspecified ground workings.

Superficial deposits

The 1:10,000 scale published geology maps indicate there are no superficial designations recorded on-site. Alluvium is recorded 47 m east of the site, Glaciofluvial sheet deposits are recorded 71 m west and Devensian Till is recorded 171 m east.

Bedrock

The 1:10,000 scale published geology indicates there are three bedrock geology designations on-site. There are four other designations within 250 m of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 9-6. Figure 9-2 presents

bedrock formations up to 250 m away from the site; beyond the 250 m buffer no bedrock information is included in this report.

Table 9-6 - Relocated Mossley Station works - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional Details
Fletcher Bank Grit	0 m	on-site	Sandstone
Marsden Formation	0 m 217 m 227 m	on-site west east	Mudstone And Siltstone
Upper Kinderscout Grit	0 m 147 m 190 m	on-site east east	Sandstone
Hebden Formation	104 m	east	Mudstone And Siltstone

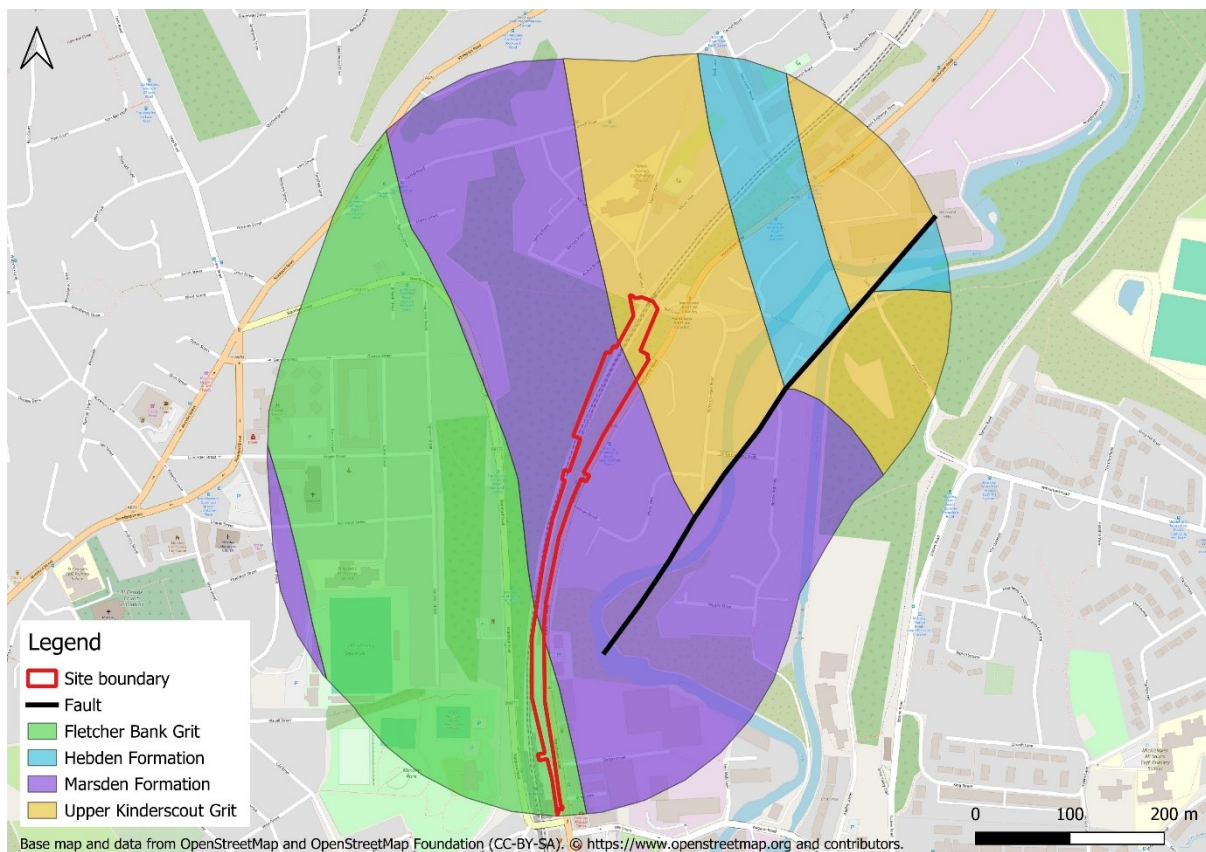


Figure 9-2 - Relocated Mossley Station works - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are no faults or linear features on-site. There is one fault recorded 64 m east of the site. Faults are visible in Figure 9-2.

9.4 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁷ indicates that there are no superficial deposits recorded underlying the site.

Bedrock aquifers

The data from Groundsure¹⁷ indicates that the geology underlying the site and surrounding 250 m has been designated as a secondary A aquifer.

The Environment Agency describes a secondary A aquifer as “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers”.

Groundwater vulnerability

Groundsure¹⁷ data indicates that the groundwater vulnerability is high for the bedrock aquifer and the superficial aquifer. A high groundwater vulnerability is defined as “*areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absences of low permeability superficial deposits.*”.

Groundwater source protection zones

The data from Groundsure¹⁷ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹⁷ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁷ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

9.5 Hydrology

Surface watercourses

There are two surface water features within 250 m of the site. The nearest surface watercourse is recorded by Groundsure¹⁷ as the River Tame and is located 55 m east of the site. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 9-7.

Table 9-7 - Relocated Mossley Station works - Surface watercourses

Name of watercourse	Type	Distance from site	Direction from site	WFD overall classification
Tame (Chew Brook to Swineshaw Brook)	River	55 m	east	Moderate
Huddersfield Narrow Canal west section	Canal	184 m	east	Moderate

Surface water discharge consents

The data from Groundsure¹⁷ indicates there are no licensed discharges to surface water features on-site. There are nine licensed discharge consents within 250 m of the site. A summary is provided in Table 9-8.

Table 9-8 - Relocated Mossley Station works - Surface water discharge consents

Permit Number	Address	Receiving Water	Distance from Site	Direction from Site	Effective Date
01TAM0090	Russell street SSO, Stockport, Greater Manchester	Coastal trib for DA 68/69	83 m	east	15/09/1993
016990371	Mossley wool combing Ltd., Milton Mills, Mossley, Ashton-under-lyne, Greater Manchester	Huddersfield Narrow Canal	137 m	east	30/06/1982
01TAM0089	Dark lane CSO 441sh, Dark lane, Mossley, Ashton-under-lyne, Greater Manchester, OL59AT	To River Tame	189 m	north-east	01/01/1995
			189 m	north-east	03/09/2010
			194 m	north-east	05/02/2016

Permit Number	Address	Receiving Water	Distance from Site	Direction from Site	Effective Date
		Unnamed Trib to River Tame	194 m	north-east	01/04/2018

Surface water abstractions

The data from Groundsure¹⁷ indicates there are no surface water abstractions within 250 m of the site.

9.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁷ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

9.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁷ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 9-9.

Table 9-9 - Relocated Mossley Station works - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is located within a coal mining area.
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral. There are no non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There are 2 other brit pits within 250 m of the site. These are located 69 m west and 106 m west. Both are surface ground working, for sandstone, but at date of entry, have ceased to extract minerals.

Category	Summary
Surface Ground Workings	There is one surface ground workings features on-site. There are 19 other surface ground workings features within 250 m of the site. Details are provided in Table 9-10.
Underground Workings	There are no underground workings on-site or within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 9-10 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 9-10 - Relocated Mossley Station works - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Cuttings	0 m	on-site	1854-1918
Unspecified Ground Workings	24 m	west	1918-1982
Refuse Heap	30 m	east	1906-1956
Unspecified Ground Workings	66 m	east	1956
Unspecified Ground Workings	73 m	west	1863-1992
Refuse Heap	95 m	east	1956-1992
Unspecified Ground Workings	98 m	north-west	1906
Pond	130 m	east	1938
Refuse Heap	136 m	west	1891-1938
Refuse Heap	141 m	south-east	1906-1907
Refuse Heap	151 m	west	1891-1918
Refuse Heap	166 m	east	1938
Unspecified Ground Workings	169 m	north-west	1923-1938
Canal	173 m	east	1891-1992
Unspecified Pit	179 m	west	1956
Bricks Works	182 m	east	1891
Unspecified Quarry	197 m	north	1854-1982

Name	Distance from site boundary	Direction from site boundary	Date
Refuse Heap	207 m	north-east	1956
Unspecified Heap	210 m	west	1863
Unspecified Quarry	237 m	north	1891-1956

The Mining Remediation Authority⁶ viewer indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁷ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 9-11. However, not all licence details have been provided by Groundsure.

Table 9-11 - Relocated Mossley Station works - Landfill and waste summary

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
Historical Landfill (La/Mapping Records)	Refuse Tip	-	34 m	East	-	-
Historical Landfill	Milton and Border Mills	Inert, Industrial, Liquid sludge	61 m	east	22/09/1981	Surrendered: 21/02/1996
Historical Landfill	-	Inert, Industrial, Liquid sludge	80 m	south-east	22/09/1981	Surrendered: 21/02/1996
Waste Exemptions	Unit E310, Warmco Industrial Estate, Manchester Road, Mossley, O15 9ay	Storage of waste in a secure place	246 m	north-east	-	-
Waste Exemptions	Longlands Mill, Queen Street, Mossley,	Storage of waste in a secure place	68 m	east	-	-

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
	Ashton-Under-Lyne, OL5 9AH	Storage of waste in secure containers			-	-
		Sorting mixed waste			-	-
		Manual treatment of waste			-	-

9.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

9.9 Sensitive land uses

The data from Groundsure¹⁷ indicates there are sensitive land uses within 250 m of the site. A site of special scientific interest (SSSI), the Huddersfield Narrow Canal is located 178 m east of the site. There are no other sensitive land uses, including Ramsar or areas of conservation within 250 m. The site is located within a SSSI impact zone.

9.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site source of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are three pollution incidents reported by Groundsure¹⁷ within 250 m of the site and a summary has been provided in Table 9-12.

Table 9-12 - Relocated Mossley Station works - Pollution incidents

Type	Distance from site	Direction from site	Category of Incident: Air	Category of Incident: Land	Category of Incident: Water	Date of Incident
General biodegradable materials and wastes	103 m	south-east	Category 4 (no impact)	Category 3 (minor)	Category 3 (minor)	06/11/2002
Pollutant not identified	188 m	east	Category 4 (no impact)	Category 4 (no impact)	Category 2 (significant)	17/10/2009
Contaminated water	205 m	east	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	28/03/2002

Pollution prevention and controls

The data from Groundsure¹⁷ indicates there are not Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure¹⁷ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁷ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁷ indicates there are no recent industrial land uses on-site. There are 14 recent industrial land uses within 250 m of the site. A summary has been provided in Table 9-13.

Table 9-13 - Relocated Mossley Station works - Contemporary trade directory

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Mast	Infrastructure and Facilities	Telecommunications Features	0m	on-site

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Mossley (Manchester) Rail Station	Public Transport, Stations and Infrastructure	Railway Stations, Junctions and Halts	7 m	west
Electricity Substation	Infrastructure and Facilities	Electrical Features	11 m	east
Electricity Substation	Infrastructure and Facilities	Electrical Features	37 m	east
Electricity Substation	Infrastructure and Facilities	Electrical Features	103 m	east
Campbells Crane Hire	Hire Services	Construction and Tool Hire	219 m	east
Wharf	Water	Moorings and Unloading Facilities	227 m	east
Hive Entertainment Ltd	Transport, Storage and Delivery	Distribution and Haulage	228 m	east
Chimney	Industrial Features	Chimneys	236 m	east
Autofix	Repair and Servicing	Vehicle Repair, Testing and Servicing	238 m	east
Crescent Sheet Metal Company	Construction Services	Metalworkers Including Blacksmiths	245 m	east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site as indicated by Groundsure¹⁷.

Contaminated land designations

According to Groundsure¹⁷, there are no sites designated as contaminated land under Part 2A of the Environment Protection Act 1990 on-site or within 250 m of the site.

9.11 Site area reconnaissance

A site area walkover was undertaken on 22 August 2024 by an AtkinsRéalis environmental scientist. A walkover was conducted prior to changes to the Order Scheme boundary. A summary of the observations made during the visit is provided as follows.

Table 9-14 – Relocated Mossley Station works - Site walkover record

Item	Description
Location	The site area comprises a section of Manchester Road and land on each side of the railway lines to the north-west of Manchester Road.
Description of current use/ activities	<p>Double metal gates are located off Manchester Road in the southern part of site.</p> <p>Manchester Road is situated at a lower level to the railway in the north-eastern area of site and the level difference increases to the north-east. In the far south of the site, Manchester Road is situated at a higher level to the railway. Land to the east of the railway is relatively level and land to the west of the railway slopes steeply up to the north-west.</p> <p>A mast is present in the central area of site, to the east of the railway. Several stockpiles of material were present at the time of the site walkover close to the access gates. Stockpiles of stone and mounds of wood chippings were visible. Anthropogenic material (e.g. plastic bags) was visible in some mounds of wood chippings and vegetation was growing from the mounds. Railway sleepers and other materials (including plastic pipes, plastic barriers) were also identified in the eastern part of the site.</p>
Fuel/chemical storage	No evidence of fuel storage was observed.
Evidence of land contamination	No evidence of significant contamination was identified.
Invasive Species	Areas of Himalayan balsam and shoots of Japanese Knotweed were identified at the time of the site walkover. The area to the west of the railway is vegetated (rough vegetation, Himalayan balsam and Japanese Knotweed visible at the time of the walkover).
Surface coverage	The ground surface close to the access gates comprises stone setts. The north-eastern part of site between the railway and Manchester Road is heavily vegetated (rough vegetation and trees). Areas of rough vegetation are also present closer to the access gates.
Boundary Types	A stone wall runs between the parcel of land to the east of the railway and Manchester Road.
Surface Water Features	No surface water features were visible.

9.12 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of current land use and future use following the development as a train station.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with former developments on-site:
 - Carr Hill Mills;
 - Railway building and sidings; and
 - Unspecified mills and tanks.
- Off-site:
 - Historical features surrounding the site including:
 - Cotton Mills;
 - Refuse heaps;
 - Railway station;
 - Brick works;
 - Garages;
 - Electricity substations;
 - Tanks;

- Quarries; and
- Unspecified industrial works.
- Current features surrounding the site including:
 - Electricity substations;
 - Vehicle repairs and servicing; and
 - Wharf.
- Historical landfill [Milton and Border Mills: 61 m east].
- Pollution incidents [103 m south-east, 188 m east, 105 m east].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a public open space and commercial end use:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of public open space areas.

- Controlled Waters:
 - Groundwater:
 - Bedrock secondary A aquifer.
 - Surface water:
 - River Tame; and
 - Huddersfield Narrow Canal west section.
- Property and Services:
 - On-site:
 - Station facilities;
 - Off-site:
 - Commercial businesses; and
 - Residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;

- lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under the current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that all personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 9-15 - Relocated Mossley Station works - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Made Ground associated with former developments on-site: Carr Hill Mills; Railway building and sidings; Unspecified mills and tanks.	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – Construction workers Future users of the site. <u>Property</u> – Station facilities <u>Off-site:</u> <u>Human Health</u> – Resident and occupiers of commercial/ industrial premises, users of public open space areas.	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The public will have access during the operation as users of the train station. However, it is unlikely that risk will be increased as the station is predominantly made up of hardstanding, buildings and railway tracks which will limit the potential for exposure. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>PCBs</i> <i>Petroleum hydrocarbons</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen</i>	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation). Inhalation of asbestos fibres.	<u>Property and Services</u> – Commercial businesses and residential properties.	Low	Severe	Moderate risk Made Ground and infilled ground are anticipated to be present on the site, which may be a source of ground gas. As the site includes plans for the creation of lift shafts, these could provide confined spaces for the accumulation and build-up of ground gas.
			Low	Severe	Moderate risk Asbestos may have been present in former structures/buildings on the site. Following the demolition of these buildings and structures, asbestos may be present within Made Ground or infilled ground. Based on the potential presence of

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
sulphide or carbon monoxide)					asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk. The majority of the site will be covered in hardstanding, or railway infrastructure therefore it is unlikely that contact with the Made Ground or infilled ground will occur. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer	Low	Medium	Moderate/Low Risk Made Ground is likely to overly bedrock across most of the site therefore piled foundations for new footbridge and lift shafts are likely to go into bedrock where no superficial deposits are found. The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifers. If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding or buildings will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in	<u>Surface Water Controlled Waters</u> –	Low	Medium	Moderate/Low Risk Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	River Tame Huddersfield Narrow Canal west section			ingress of groundwater. The hydraulic gradient is assumed to be towards the south-east, towards the River Tame. Given the short distance between the site and the Huddersfield Narrow Canal west section and the River Time, it is likely that contaminants originating on-site could reach the river. Given the distances of the surface water receptors from the site, they are considered viable migration pathways of contaminants within groundwater (secondary A bedrock aquifers). If significant contamination is present, reworking of the Made Ground and infilled ground on-site during construction activities may mobilise contaminants and introduce a pathway for contaminants. Where hardstanding or buildings will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Cotton Mills; Refuse heaps; Garages; Electricity substations; Brick works; Railway station; Tanks;	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	On-site: <u>Human Health</u> – Construction workers Future users of the railway station <u>Property</u> – Station facilities	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is possible for future site users to come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/Low Risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Any cohesive superficial deposits present

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Quarries; and Unspecified industrial works. Current features surrounding the site including: Electricity substations; Vehicle repairs and servicing; and Wharf. Historical landfill [Milton and Border Mills: 61 m east] Pollution incidents					between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site. The majority of the off-site sources are located down hydraulic gradient from the site, therefore are unlikely to migrate on to the site. However, there are some off-site sources located up hydraulic gradient which could potentially result in contaminants migrating to the site. These sources are possibly underlain by a superficial aquifer which may limit the migration of contaminants. The nearest recorded superficial deposits are sand/gravel to the west and clay to the right which will limit migration of contaminants as the majority of off-site sources are located in the east of the site.
<i>Possible contaminants include: Asbestos Metals PAHs Petroleum hydrocarbons VOCs PCBs Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	Moderate/Low Risk One historical landfill is located within 100 m of the site to the south, which could be a potential source of ground gas, however it has not been active since 1981. Therefore, it is unlikely that the site would still be producing gas at a high rate, or to a significant level that it would reach the site. No coal seams are found around the site. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways that might re-direct migration of gas and this should be considered during design.

9.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with the CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of materials is in line with the DOWCOP suitability for use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots, or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If

risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

The potential risks to human health and controlled waters associated with piling at the site would be considered within a piling risk assessment, as required, with the appropriate mitigation implemented through the CoCP.

10. BASELINE FOR ROUGHTOWN ROAD OVERBRIDGE (MVL3/17)

10.1 Site history

Table 10-1 provides a summary of the historical development at the Roughton Rd overbridge site and the surrounding 250 m buffer area. The history of the site and the 250 m surrounding area has been determined principally by reference to historical maps obtained from Groundsure¹⁷.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 10-1 - Roughtown road overbridge (MVL3/17) - Summary of historical development

Feature	Date	Distance from the site boundary	Direction from the site boundary
Cuttings	1854-1992	0 m	on-site
Railway sidings	1891-1970	0 m	on-site
Unspecified old quarries	1894-1909	0 m	on-site
Unspecified structures	1894-1955	0 m	on-site
Unspecified tank	1909-1922	0 m	on-site
Allotment gardens	1954-1990	0 m	on-site
Tramway	1909-1933	3 m	south-east
Railway sidings	1891-1970	3 m	north-west
Cotton Mills	1891-1992	7 m	south-east
Refuse heap	1956	9 m	south-east
Carhill Mills	1891-1992	15 m	south-east
Unspecified pit	1891-1982	29 m	south-east
Cuttings	1854-1992	31 m	north-east
Unspecified quarry	1891-1938	32 m	east
Electricity substation	1996	33 m	south
Unspecified tank	1891	53 m	south-east
Allotment gardens	1954-1955	53 m	west
Unspecified tank	1918-1923	59 m	south

¹⁷ Groundsure 2024. Enviro + Geo Insight (GS-4F5-ES2-8TP-9FB)

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Feature	Date	Distance from the site boundary	Direction from the site boundary
Unspecified tank	1909-1955	69 m	south
Unspecified ground workings	1891-1906	71 m	north
Woodend Mills	1904-1956	75 m	south-east
Unspecified quarry	1854-1904	81 m	north
Unspecified pit	1956-1982	85 m	north
Refuse heap	1918-1938	93 m	north
Electricity substation	1991-1996	94 m	north-west
Unspecified quarry	1930-1938	94 m	north-west
Railway building	1891-1956	95 m	south-west
Unspecified industrial/commercial	1854	97 m	south-east
Unspecified pit	1956	101 m	north-west
Unspecified heap	1956	107 m	south
Dye Works	1891-1938	110 m	north-west
Refuse heap	1938	111 m	south
Electricity substation	1954-1996	116 m	south-east
Allotment gardens	1933-1992	120 m	north-west
Unspecified tank	1909-1933	126 m	west
Milton Mill	1906-1992	127 m	south
Bricks Works	1891-1982	136 m	south-east
Disused tank	1954-1955	138 m	north-west
Chimney	1970-1992	139 m	south
Garage	1996	143 m	east
Unspecified ground workings	1906-1982	152 m	south-west
Railway sidings	1938	156 m	south
Tanks	1909-1933	157 m	north-west
Carhill Quarry	1891-1982	159 m	west
Unspecified ground workings	1854	161 m	north-west
Unspecified commercial/industrial	1907	163 m	south
Stamford Mill	1891-1992	164 m	east
Tanks	1954-1955	171 m	north-west
Unspecified pit	1956	172 m	west
Unspecified pit	1904-1982	181 m	north-east

Feature	Date	Distance from the site boundary	Direction from the site boundary
Railway sidings	1891-1970	187 m	south-west
Unspecified commercial/industrial	1891	187 m	north-east
Roughtown Mill	1918-1956	193 m	north-east
Unspecified tank	1898	198 m	south
Electricity substation	1954-1955	200 m	north-east
Unspecified tanks	1894-1938	202 m	south
Unspecified tanks	1923-1972	214 m	south
Unspecified tanks	1894-1923	216 m	north-east
Refuse heap	1906-1938	225 m	south
Unspecified heap	1938	239 m	west
Refuse heap	1891	241 m	west
Unspecified old quarry	1930	245 m	north
Unspecified works	1982-1992	247 m	north-east
Unspecified tank	1872	249 m	south-east

10.2 Published geology

A summary of the published geology relevant to the Roughtown Road Overbridge (MVL/17) site is provided below. The data has been sourced from Groundsure¹⁸ and the British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not recorded on-site. Made Ground is recorded within 250 m of the site, approximately 23 m south-east.

Superficial deposits

The 1:10,000 scale published geology maps indicate there are no superficial deposits mapped on-site. Alluvium is mapped 65 m south-east of the site, and Devensian Till is mapped 134 m south-east of the site.

Bedrock

The 1:10,000 scale published geology indicates there are two bedrock geology designations on-site. There are two other bedrock geology designations within 250 m of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table

10-2. Figure 10-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 10-2 - Roughtown road overbridge (MVL3/17) - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional details
Hebden Formation	0 m 125 m	on-site south-east	Mudstone and siltstone
Lower Kinderscout Grit	0 m	on-site	Sandstone
Upper Kinderscout Grit	0 m 131 m	on-site south-east	Sandstone
Kinderscout Grit	144 m	south-east	Sandstone
Marsden Formation	138 m 148 m	south-east west	Mudstone and siltstone

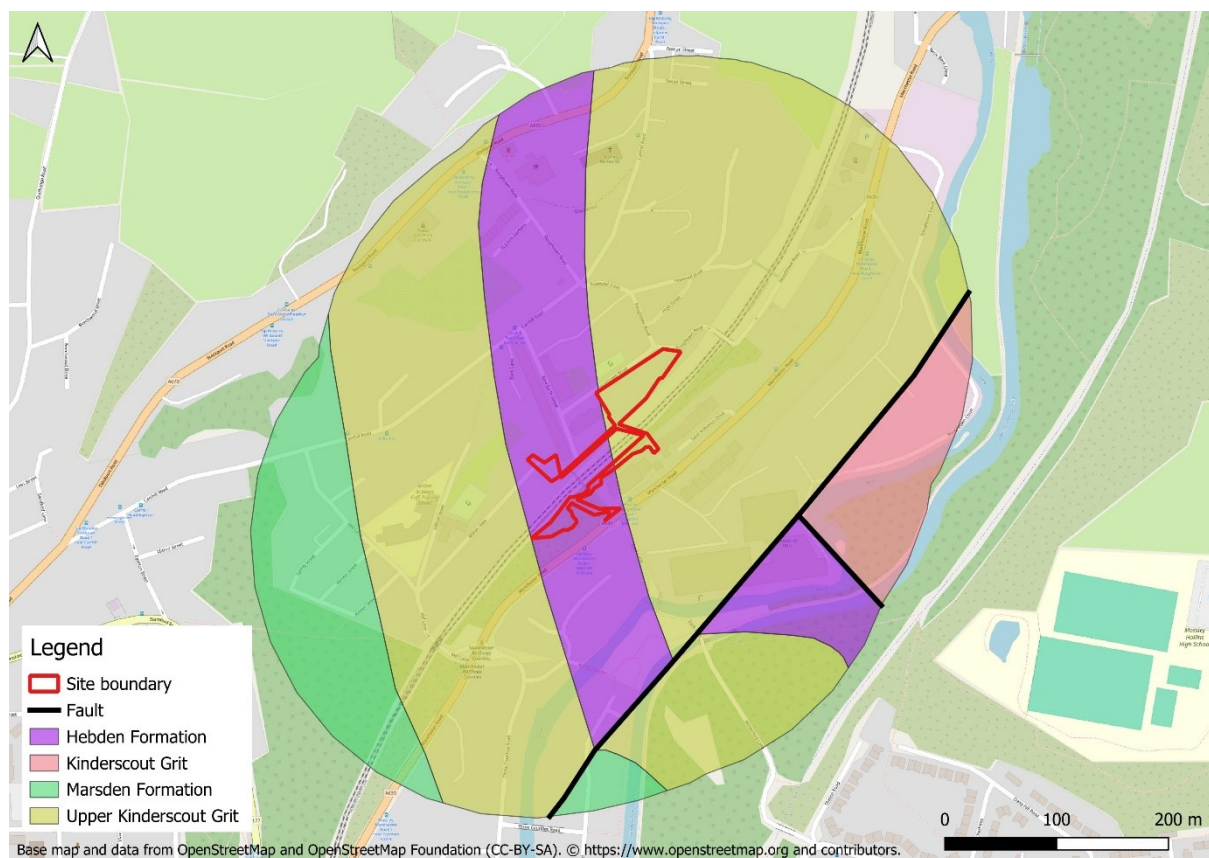


Figure 10-1 - Roughtown road overbridge (MVL3/17) - Summary of bedrock

Faults and linear features

The 1:10,000 scale published geology indicates there are no bedrock faults on-site. There are two other bedrock faults within 250 m of the site. A summary is provided in Table 10-3 and faults are visible in Figure 10-1.

Table 10-3 - Roughtown road overbridge (MVL3/17) - Bedrock structural feature summary

Data source	Description	Orientation	Distance from the site boundary	Direction from the site boundary
Fault	Normal fault, inferred	north-east to south-west	125 m	south-east
Fault	Normal fault, inferred	north-west to south-east	138 m	south-east

10.3 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁸ indicates that there are no superficial aquifers on-site. The closest superficial aquifer is a secondary A aquifer, located 66 m south-east. A secondary undifferentiated aquifer is located 134 m south-east of the site. The Environment Agency provides the following descriptions for the aforementioned aquifer designations:

Secondary A aquifer: Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

Secondary undifferentiated aquifer: Assigned where it is not possible to attribute either category A or B to a rock type.

Bedrock aquifers

The data from Groundsure¹⁸ indicates the presence of a secondary A bedrock aquifer underlying the site and surrounding area, associated with Lower Kinderscout Grit, and the Hebden Formation.

Groundwater vulnerability

Groundsure¹⁸ data indicates that the groundwater vulnerability is high for the bedrock aquifer vulnerability. High vulnerability refers to areas that are able to easily transmit pollution to groundwater.

Groundwater source protection zones

The data from Groundsure¹⁸ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹⁸ indicates there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁸ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

10.4 **Hydrology**

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹⁸ as the River Tame and is located 88 m south of the site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 10-4.

Table 10-4 - Roughtown road overbridge (MVL3/17) - Surface water courses

Name of watercourse	Type	Flow direction	Distance from site	Direction from site	WFD overall classification
Tame (Chew Brook to Swineshaw Brook)	River	south	88 m	south	Moderate
Huddersfield Narrow Canal west section	Canal	-	141 m	south-east	Moderate

Surface water discharge consents

The data from Groundsure¹⁸ indicates there are no licensed discharge to surface water features on-site. There are five licensed discharge to surface water features within 250 m of the site. In addition, there are no pollutant releases to surface water features on-site or within 250 m of the site. A summary of all surface water discharge consents within 250 m of the site has been provided in Table 10-5.

Table 10-5 - Roughtown road overbridge (MVL3/17) - Surface water discharge consents

Permit number	Effluent type	Address	Receiving water	Distance from site	Direction from site	Effective date
01TAM0089	Sewage discharges – sewer storm overflow – water company	Dark Lane CSO	River Tame	66 m	south-east	01/01/1995 , revoked 02/09/2010
		441sh, Dark Lane, Mossley, Ashton		66 m		03/09/2010 , revoked 04/02/2016
		Under Lyne, Greater Manchester , OL5 9AT		73 m		05/02/2016 , revoked 31/03/2018
				73 m		01/04/2018 , to present
016990371	Trade discharges – cooling water	Mossley Wool Combing Ltd, Milton Mills, Mossley, Ashton-Under-Lyne, Greater Manchester	Huddersfield Narrow Canal	160 m	south	30/06/1982 , revoked 01/03/1991

Surface water abstractions

The data from Groundsure¹⁸ indicates there are no surface water abstractions within 250 m of the site.

10.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁸ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

10.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁸ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 10-6.

Table 10-6 - Roughtown road overbridge (MVL3/17) - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams recorded on the site or within 250 m of the site.
Coal mining areas	The site is located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. There are no other non-coal mining areas within 250 m of the site.
British pits (active or closed surface and underground mineral workings)	There are no Brit pits recorded on-site. There are two other Brit pits within 250 m of the site. These are located 78 m north and 162 m north-west. Both are surface ground working, for sandstone, but at date of entry, have ceased to extract minerals.
Surface ground workings	There are two surface ground workings features on-site. There are 19 other surface ground workings features within 250 m of the site. Details are provided in Table 10-7.
Underground workings	There are no underground workings on-site or within 250 m of the site.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 10-7 further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 10-7 - Roughtown road overbridge (MVL3/17) - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1854-1992
Unspecified old quarries	0 m	on-site	1904
Refuse heap	11 m	south-east	1956

Name	Distance from site	Direction from site	Date
Unspecified pit	29 m	south-east	1956-1982
Cuttings	31 m	north-east	1970-1992
Unspecified old quarries	34 m	south-east	1894-1938
Sandstone Quarry	70 m	north	1854-1906
Pond	77 m	south-east	1938
Refuse heap	86 m	north	1918-1982
Unspecified quarry	94 m	north-west	1930-1956
Refuse heap	111 m	south	1938-1956
Canal	126 m	south-east	1891-1992
Bricks Works	136 m	south-east	1891
Unspecified ground workings	155 m	south-west	1918-1982
Unspecified quarry	160 m	west	1854-1982
Canal	177 m	south	1907
Unspecified quarry	183 m	west	1891-1906
Unspecified pit	191 m	north-east	1904-1982
Refuse heap	234 m	south	1906-1938
Refuse heap	241 m	west	1891-1938
Unspecified old quarry	245 m	north	1930

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁸ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 10-8.

Table 10-8 - Roughtown road overbridge (MVL3/17) - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
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Historical landfill	Woodend Mill	Inert	163 m	east	24/01/1992	Surrendered , Active: 31/12/1981- 11/03/1993
	Woodend Mill	Inert	238 m	north-east	24/01/1992	Surrendered , Active: 01/02/1992- 11/03/1993
Waste exemptions	Unit E310, Warmco Industrial Estate, Manchester Road, Mossley, OL5 9AY	Storage of waste in a secure place	11 m	south-west		
		Recovery of scrap metal	128 m	south-east		
		Storage of waste in a secure place	145 m	north-east		

10.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

10.8 Sensitive land uses

The data from Groundsure¹⁸ indicates there are sensitive land uses within 250 m of the site. A site of special scientific interest (SSSI), relating to the Huddersfield Narrow Canal, is located 129 m south-east of the site. The site is located within a SSSI impact zone. No other sensitive land uses, including Ramsar sites, nature reserves or areas of conservation, are recorded within 250 m of the site.

10.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are four pollution incidents reported by Groundsure¹⁸ within 250 m of the site and a summary has been provided in Table 10-9.

Table 10-9 - Roughtown road overbridge (MVL3/17) - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Pollutant not identified	79 m	south-east	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	17/10/2009
Contaminated water – urban run-off	83 m	south-east	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	28/03/2002
Contaminated water – chemically contaminated run-off	203 m	south-east	Category 3 (Minor)	Category 4 (No Impact)	Category 1 (Major)	12/06/2010
General biodegradable materials and wastes – other	223 m	south	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	06/11/2002

Pollution prevention and controls

The data from Groundsure¹⁸ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. A summary of the number and location of these applications has been provided in Table 10-10.

Table 10-10 - Roughtown road overbridge (MVL3/17) - Pollution controls overview

Pollution prevention and control category	Summary
Pollution inventory substances	There are no pollution inventory substances on-site or within 250 m of the site.

Pollution prevention and control category	Summary
Licensed pollutant release (part A(2)/B)	There are no licensed pollutant release part 2A and B features on-site. There is one licensed pollutant release part A2 and B features within 250 m of the site. The historical licensed pollutant release (part B) is located 216 m north-west of the site and is associated with petrol vapour recovery.
Historical licensed industrial activities	There are no historical licensed industrial activities on-site or within 250 m of the site.
Licensed industrial activities (part A(1))	There are no licensed industrial activities on-site or within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure¹⁸ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents on or within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁸ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁸ indicates there are no recent industrial land uses on-site. There are 19 recent industrial land uses within 250m of the site. A summary has been provided in Table 10-11.

Table 10-11 - Roughtown road overbridge (MVL3/17) - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
George Sixsmith & Son Ltd	Consumer Products	Musical Instruments	70 m	north-west
Hive Entertainment Ltd	Transport, Storage and Delivery	Distribution and Haulage	71 m	south-east
Autofix	Repair and Servicing	Vehicle Repair, Testing and Servicing	88 m	south-east
Crescent Sheet Metal Company	Construction Services	Metalworkers Including Blacksmiths	95 m	south-east
Chimney	Industrial Features	Chimneys	109 m	south-east

Site	Industrial land use category	Description	Distance from site	Direction from site
Electricity Substation (3no.)	Infrastructure and Facilities	Electrical Features	Closest 114 m	north-west
Myatt's of Mossley	Repair and Servicing	Vehicle Repair, Testing and Servicing	134 m	south-east
Industrial Park	Industrial Features	Business Parks and Industrial Estates	159 m	south-east
Broadbent Car & Commercial	Repair and Servicing	Vehicle Repair, Testing and Servicing	162 m	east
Notorious	Consumer Products	Clothing, Components and Accessories	162 m	east
D S Window Doors & Conservatories Ltd	Industrial Products	General Construction Supplies	167 m	east
Geotron UK Ltd	Construction Services	Cutting, Drilling and Welding Services	167 m	east
K Broadbent Carpet Contractors	Construction Services	Construction Completion Services	213 m	east
P N P	Engineering Services	Electrical and Electronic Engineers	217 m	south-east
M D R Autos	Repair and Servicing	Vehicle Repair, Testing and Servicing	218 m	north-east
Mast	Infrastructure and Facilities	Telecommunications Features	219 m	south-west
Vertical Access Ltd	Engineering Services	Civil Engineers	241 m	east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site, as indicated by Groundsure¹⁸.

Contaminated land designations

According to Groundsure¹⁸, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250m of the site.

10.10 Site area reconnaissance

A site area walkover was undertaken on 23 October 2024 by two AtkinsRéalis environmental scientists. The walkover was conducted prior to the addition of the Milton View compound to the Order Scheme; therefore, this area has not been viewed as part of the walkover. A summary of the observations made during the visit is provided as follows.

Table 10-12 – Roughtown road overbridge (MVL3/17) - Site walkover record

Item	Description
Current use and status of the site	Vacant land (South and North Roughtown sites). Public footpath leading from Manchester Road to foot bridge over railway in south-east part of site (South Roughtown)
General condition of site and surrounding land use	<p>South Roughtown Site</p> <ul style="list-style-type: none"> Immediately adjacent (north/north-east) south part of site is recreation buildings – these appeared vacant at the time of visit. Manchester road to south-east. Railway line to north-north-west <p>North Roughtown site</p> <ul style="list-style-type: none"> Railway line to east/south-east Residential to south-west north-east and north with playground.
Presence of visual contamination, made ground, surface staining and odours	<ul style="list-style-type: none"> No olfactory/visual evidence of contamination. Evidence of fly tipping.
Topography and surface condition – open ground, hardstanding and other geotechnical or surface features	Steep gradient down from west to railway in east. 95% vegetation cover. Public footpath to foot bridge is cobbled.
Local surface water features	N/A
Presence and type of vegetation	Very heavily vegetated – grass, weeds, trees, bushes etc.
Signs of any vegetation dieback	No
Presence and extent of any non-native invasive plants such as Himalayan balsam, New Zealand pigmy weed or Giant hogweed	No

Item	Description
Buildings and below or above ground structures such as fuel tanks	No evidence of buildings or structures.
Above and likely below ground services	No evidence of services
Access to and security of the site	Access not granted at time of walkover so used Public Right of Way (PROW) Pedestrian access is available along public footpath. South Roughtown completely inaccessible as bounded by metal fencing and brick walls. No clear access point for vegetated land in both north and south sites.
Presence of any potential off-site receptors	Residential
Potential presence of any asbestos cement material within buildings or throughout the site	No evidence of asbestos cement material
Communications or discussions with site personnel	No communications or discussions with site personnel

10.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

Historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and potential/future uses following proposed reconstruction of the existing overbridge and as a storage compound. It is assumed the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with former developments on-site:
 - Railway sidings; and
 - Unspecified structures/buildings;
 - Historical on-site uses including:
 - Unspecified tanks;
 - Allotment gardens; and
 - Old quarries.
- Off-site:
 - Historical features surrounding the site including:
 - Refuse heaps;
 - Carhill Mills;
 - Unspecified quarries;
 - Electricity substations;
 - Unspecified tanks;
 - Woodend Mills;
 - Railway buildings;
 - Dye Works;
 - Milton Mills;
 - Brick Works;
 - Garage;
 - Allotment gardens;
 - Carhill Quarry;
 - Stamford Mill; and
 - Roughtown Mill.

- Current features surrounding the site including:
 - Metalworkers;
 - Electricity substations;
 - Vehicle repairs and servicing;
 - Construction services;
 - Engineering services;
 - Telecommunication features; and
 - Industrial products.
- Historical landfill:
 - Woodend Mill [163 m east].

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene, ethylbenzene, polychlorinated biphenyls (PCBs) and xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Resident and occupiers of commercial/ industrial premises; and

- Controlled Waters:
 - Groundwater:
 - Secondary A bedrock aquifer;
 - Surface Water:
 - River Tame [88 m south]; and
 - Huddersfield Narrow Canal west section [141 m south-east]
- Property and Services:
 - On-site:
 - Access route; and
 - Structures (overbridge) and services.
 - Off-site:
 - Commercial businesses; and
 - Residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;

- lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 10-13 - Roughtown road overbridge (MVL3/17) - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Made Ground associated with former developments on-site: Railway sidings; Unspecified structures/buildings Historical on-site uses including: Unspecified tanks; Allotment gardens; and Old quarries.	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – On-site users Future users of the site. <u>Property and services:</u> Access route Overbridge <u>Off-site:</u> Human Health – Residents and occupiers of commercial/industrial premises Users of public open spaces.	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is potential for contaminants to be present in soil and groundwater on-site. Future site users are unlikely to come into contact with soil as the site is made up of mainly hardstanding. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i>	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	Property and Services – Commercial businesses and residential properties.	Unlikely	Medium	Low Risk Made Ground is not recorded on-site, however, may still be present, which could be a source of ground gas. A quarry was historically recorded on-site which may have been infilled and could be a possible source of ground gas. However, the site does not require any confined or indoor spaces therefore accumulation of ground gas is unlikely.
	Inhalation of asbestos fibres.		Low	Severe	Moderate risk Given the previous use of the site there is a potential for asbestos to be present. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk.

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<p><i>Volatile organic compounds (VOCs)</i> <i>Ground gases</i> <i>(methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.</p>	<p><u>Groundwater</u> <u>Controlled</u> <u>Waters</u> – Bedrock secondary A aquifer</p>	<p>Low</p>	<p>Medium</p>	<p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <hr/> <p>Moderate/low risk The proposed development does not include the use of piled foundations, and any necessary excavations are unlikely to be deep enough to create new preferential pathways. As no superficial deposits are recorded on-site, Made Ground will directly overlay bedrock resulting in minimal mitigation of potential migration. The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater. There are no superficial deposits located on-site to limit vertical and lateral migration in that area.</p>
	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to</p>	<p><u>Surface Water</u> <u>Controlled</u> <u>Waters</u> – River Tame Huddersfield Narrow Canal west section</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk Given the short distance between the site and the River Tame, it is likely that contaminants originating on-site could reach the river. Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the south, towards the River Tame. The proposed works to reconstruct the footbridge and provide access to the railway for electrics work are unlikely to create new migration pathways.</p>

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	controlled surface waters.				Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Refuse heaps; Carhill Mills; Unspecified quarries; Electricity substations; Unspecified tanks; Woodend Mills; Railway buildings; Dye Works; Milton Mills; Brick Works; Garage; Carhill Quarry; Stamford Mill; and Roughtown Mill. Current features surrounding the site including: Metalworkers; Electricity substations;	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	On-site: <u>Human Health</u> – On-site users Future users of the bridge <u>Property and services:</u> Overbridge Access route	Unlikely	Medium	Low risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is possible for future site users to come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.	.	Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings that have now been demolished. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Unlikely	Medium	Low Risk There is the potential of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer given the distance of the potentially contaminative off-site land uses. Any superficial deposits present between the potential Made Ground and bedrock will limit migration of contaminants. Superficial deposits are present underlying some of the off-site sources in the east, which will limit their migration, however there are no superficial deposits located to the south which could increase the probability and risk of contaminants

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Vehicle repairs and servicing; Construction services; Engineering services; Telecommunication features; and Industrial products. Historical landfill: Woodend Mill [169 m east].	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	Unlikely	Medium	migrating to the site from those sources. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site. Most off-site sources of contamination are down gradient from the site therefore are unlikely to migrate up the hydraulic gradient onto the site.
<i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>				Low risk No on-site receptors identified that would be impacted by off-site gas.

10.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

As the risk to future site users is generally low, there is no specific mitigation required to reduce the impact to human health for the site.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated

for inclusion in a verification report to demonstrate the remediation has been completed.

11. BASELINE FOR HERON LANE SITE COMPOUND AND WRIGHTS MILL OVERBRIDGE (MVL3/20) RECONSTRUCTION

11.1 Site history

Table 11-1 provides a summary of the historical development at the Heron Lane site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure¹⁸.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 11-1 - Heron Lane Site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Summary of the historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1854-1992	0 m	on-site
Unspecified Pit	1938-1956	1 m	north
Unspecified Mill	1891-1956	2 m	north-east
Unspecified Ground Workings	1906-1923	5 m	north
Unspecified Foundry	1906-1970	7 m	south-east
Unspecified Pit	1923	7 m	west
Unspecified Ground Workings	1906-1923	8 m	north
Unspecified Mill	1891-1956	8 m	north-east
Cotton Mill	1854	13 m	east
Unspecified Ground Workings	1906-1918	13 m	west
Unspecified Heap	1891-1906	13 m	east
Unspecified Mill	1891-1970	18 m	east

¹⁸ Groundsure 2024. Enviro + Geo Insight (GS-GWW-SKK-3TG-CRD)

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Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Works	1982-1992	18 m	east
Chimney	1970-1992	25 m	north
Cuttings	1854-1992	26 m	west
Unspecified Tank	1954-1992	26 m	north
Unspecified Works	1982-1992	31 m	south
Unspecified Pit	1904-1982	32 m	south-west
Cuttings	1854-1992	39 m	north
Electricity Substation	1954	51 m	east
Unspecified Ground Workings	1906-1918	57 m	south-west
Garage	1959-1992	58 m	north
Unspecified Mill	1904-1956	70 m	south
Unspecified Mill	1891-1970	72 m	east
Iron Works	1904-1938	88 m	east
Gravel Pit	1918	91 m	east
Bricks Works	1891	94 m	east
Refuse Heap	1923-1938	94 m	east
Sewage Works	1904-1956	97 m	north-east
Refuse Heap	1923-1970	98 m	east
Garage	1959-1992	103 m	north-west
Sewage Works	1904-1956	103 m	north-east
Fire Station	1938-1982	108 m	east
Spring Mill	1891-1956	108 m	east
Garage	1982-1992	110 m	north-west
Cuttings	1906	111 m	north-east
Unspecified Disused Mill	1938	118 m	east
Iron Works	1891-1970	119 m	east
Gas Works	1891-1978	122 m	east
Gasometer	1891-1923	124 m	east
Unspecified Tanks	1930-1956	124 m	east
Electricity Substation	1981-1984	126 m	east
Unspecified Mills	1891-1992	129 m	east
Cotton Mill	1854	130 m	south

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
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Feature	Date	Distance from site boundary	Direction from site boundary
Electricity Substation	1992-1993	131 m	east
Gasometers	1891-1970	132 m	east
Refuse Heap	1918-1923	132 m	north-east
Unspecified Tanks	1930-1956	132 m	east
Electricity Substation	1955	135 m	east
Gas Holder	1978-1984	135 m	east
Gasometer	1894-1955	135 m	east
Refuse Heap	1918-1923	138 m	north-east
Settling Tanks	1933	138 m	north-east
Gas Works	1891-1970	143 m	east
Unspecified Quarry	1891-1938	143 m	west
Settling Tanks	1909-1954	144 m	north-east
Sandstone Quarry	1854-1992	146 m	west
Electricity Substation	1954-1955	147 m	south
Gasometer	1891-1923	148 m	east
Sandstone Quarry	1854-1992	148 m	north-west
Gas Works	1894-1978	150 m	south-east
Gasometers	1891-1970	151 m	south-east
Unspecified Tank	1909-1954	151 m	north-east
Unspecified Ground Workings	1891	153 m	west
Refuse Heap	1956-1970	154 m	east
Unspecified Tanks	1918-1956	154 m	south-east
Unspecified Tank	1982-1992	157 m	north-west
Unspecified Tank	1906-1923	159 m	north-east
Gasometers	1894-1984	160 m	south-east
Tanks	1933	160 m	north-east
Gas Holder	1955-1982	160 m	south-east
Tanks	1894	164 m	east
Unspecified Tank	1923	164 m	south
Unspecified Tank	1906-1933	165 m	north-east
Unspecified Mill	1891-1992	166 m	south-east
Bricks Works	1891	174 m	east

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
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Feature	Date	Distance from site boundary	Direction from site boundary
Cotton Mills	1854	174 m	north-west
Gasometer	1891-1965	176 m	south-east
Unspecified Tank	1894-1956	181 m	south-east
Gas Governor	1992-1993	186 m	east
Unspecified Commercial/Industrial	1891	192 m	north-west
Unspecified Tank	1955	194 m	south-east
Unspecified Mill	1904-1970	198 m	east
Unspecified Works	1982-1992	198 m	east
Pumping Station	1918-1970	199 m	north
Tanks	1894-1918	204 m	south-east
Unspecified Mills	1891-1956	207 m	east
Unspecified Tank	1894-1909	207 m	east
Cuttings	1891-1982	208 m	east
Unspecified Mill	1930	210 m	south
Electricity Substation	1955	212 m	south-east
Tanks	1933	214 m	north-east
Electricity Substation	1981-1933	217 m	south-east
Unspecified Works	1982	217 m	east
Unspecified Tanks	1938	218 m	north
Garage	1996	219 m	south
Refuse Heap	1923-1956	219 m	east
Old Sandstone Quarry	1854-1938	220 m	north
Tanks	1933-1938	220 m	north-east
Pumping Station	1918-1938	221 m	north-west
Cuttings	1891-1970	230 m	east
Unspecified Ground Workings	1891-1938	230 m	north
Unspecified Tanks	1938	231 m	north
Electricity Substation	1992-1993	238 m	south-east
Gas Governor	1992-1993	240 m	south-east
Iron Works	1891-1956	240 m	south-east
Unspecified Heap	1938	243 m	east
Motor Works	1918-1938	244 m	east

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Pit	1956-1982	245 m	south-west
Iron Works	1904-1992	246 m	south-east
Unspecified Mill	1891-1970	246 m	south-east
Unspecified Old Quarry	1904-1938	246 m	west
Cuttings	1904-1982	247 m	east
Refuse Heap	1923-1956	247 m	east

11.2 Previous ground investigations

Description of investigation

An intrusive ground investigation was undertaken by Structural Soils Ltd. In March 2018¹⁹ around the existing bridge structures, MVL3/25, MVL3/26 and viaduct MVL3/31, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Two of the locations are within 250 m of the site and have been summarised in Table 11-2 and the investigation locations are displayed in Figure 11-1.

Table 11-2 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Summary of investigation

Item	No. undertaken
Number of boreholes	None
Number of trial pits	Two
PID* testing undertaken	None
Number of soil samples tested	None
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	

¹⁹ Structural Soils Ltd. 2018 TransPennine Route Upgrade Factual Report on Ground Investigation (151667-TSA-05-MVL3-DM3-X-MF-700011)



Figure 11-1 - Heron Lane site Compound and Wrights Mill Overbridge (MVL3/20) reconstruction - Previous investigations

Ground conditions

Table 11-3 summarises the ground conditions encountered during the ground investigation.

Table 11-3 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Dark grey slightly sandy gravel of granite (Clean ballast)	0.12 – 0.16 (Trial pit begins below rail line).	0.61 - 0.77
	Dark greyish black slightly sandy gravel. Gravel of ash and ballast. (Very dirty ballast)		

	Dark grey slightly sandy gravel of granite (Clean ballast)		
Weathered Sandstone	Light yellowish grey silty slightly gravelly sand. Gravel of sandstone.	0.61	0.66
Bridge Deck			

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic materials is displayed in Table 11-4.

Table 11-4 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Summary of anthropogenic materials observed

Exploratory Hole	Depth (m)	Comment	Strata
TP2001	0.52 – 0.77	Ash inclusions	Made Ground

11.3 Published geology

A summary of the published geology relevant to the Heron Lane Site Compound and Wrights Mill Overbridge (MVL3/20) reconstruction is provided below. The data has been sourced from Groundsure¹⁹ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is recorded on-site. Made Ground is also recorded within 250 m of the site.

Superficial deposits

The 1:10,000 scale published geology maps indicate that Alluvium and Head deposits are both mapped on-site. Devensian Till is also recorded 87 m east of the site.

Bedrock

The 1:10,000 scale published geology indicates there is one bedrock geology designation on-site. There are three other bedrock geology designations within 250 m of the site.

A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 11-5. Figure 11-2 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 11-5 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Bedrock geology summary

Data source (scale)	Description	Distance from site boundary	Direction from site boundary	Additional Details
Bedrock Geology (1:10,000)	Upper Kinderscout Grit	0 m	on-site	Sandstone
		82 m	east	
		125 m	west	
		179 m	north	
		226 m	north	
Bedrock Geology (1:10,000)	Hebden Formation	18 m	west	Mudstone And Siltstone
		131 m	north	
		190 m	north-west	
Bedrock Geology (1:10,000)	Kinderscout Grit	154 m	south-east	Sandstone
Bedrock Geology (1:10,000)	Marsden Formation	219 m	west	Mudstone And Siltstone

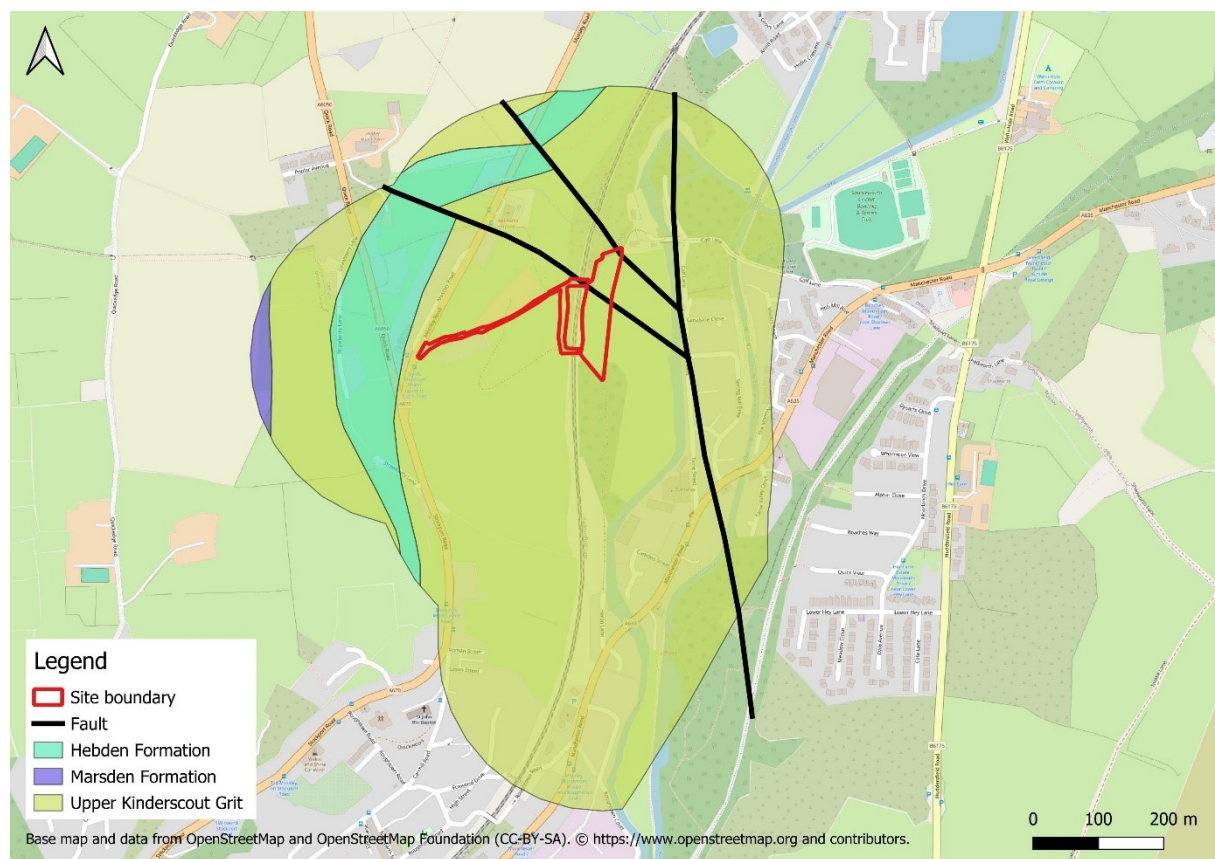


Figure 11-2 - Heron Lane site Compound and Wrights Mill Overbridge (MVL3/20) reconstruction - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are two bedrock faults on-site. There is one other bedrock fault within 250 m of the site. A summary is provided in Table 11-6 and faults are visible in **Error! Reference source not found.**

Table 11-6 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Bedrock structural geology summary

Data source	Description	Distance from site boundary	Direction from site boundary
Fault	Normal fault, inferred	0 m	on-site
Fault	Normal fault, inferred	0 m	on-site
Fault	Normal fault, inferred	82 m	east

11.4 Hydrogeology

Superficial aquifers

The data from Groundsure¹⁹ indicates that there is a secondary A aquifer on-site, associated with the Alluvium deposits. There is also a secondary (Undifferentiated) aquifer on-site, associated with the Head deposits.

The Environment Agency classifies a secondary A aquifer as “permeable layers capable of supporting water supplies to a local rather than strategic scale and in some cases forming an important source of base flow to rivers”.

A secondary (Undifferentiated) aquifer is classified as “when it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type”.

Bedrock aquifers

The data from Groundsure¹⁹ indicates that the site and surrounding area is underlain by a secondary A aquifer.

Groundwater vulnerability

Groundsure¹⁹ data indicates that the groundwater vulnerability is high for both the superficial and bedrock aquifer. This indicates that the site is located in “an area easily able to transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits”.

Groundwater source protection zones

The data from Groundsure¹⁹ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure¹⁹ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure¹⁹ indicates that there are no licensed discharge to groundwater features on-site or within 250 m of the site.

11.5 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure¹⁹ as an unnamed watercourse and is located 12 m north of the site. A summary of all surface water courses (rivers, lakes, canals and coastal and transitional waters) within 250 m of the site has been provided in Table 11-7.

Table 11-7 - Heron Lane site Compound and Wrights Mill Overbridge (mv13/20) reconstruction - Surface watercourses

Name of watercourse	Type	Distance from site	Direction from site	WFD overall classification
Unnamed watercourse	On ground surface watercourse	12 m	north	-
Tame (Chew Brook to Swineshaw Brook)	River	65 m	east	Moderate
Huddersfield Narrow Canal west section	Canal	179 m	east	Moderate

Surface water discharge consents

The data from Groundsure¹⁹ indicates there are no licensed discharge to surface water features on-site. There are five licensed discharges to surface water features within 250 m of the site. A summary has been provided in Table 11-8. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 11-8 - Heron Lane site Compound and Wrights Mill Overbridge (mv13/20) reconstruction - Surface water discharge consents

Permit number	Effluent Type	Address	Receiving water	Distance from site	Direction from site	Effective date
016940369	Sewer storm overflow – water company	Roaches Lock CSO, 389 Manchester Road (A635), Mossley, Ashton-Under-Lyne, Greater	River Tame	53 m	east	07/12/2020

Permit number	Effluent Type	Address	Receiving water	Distance from site	Direction from site	Effective date
		Manchester, OL5 9BB				
EPRJB3892WZ	Treated effluent – water company	Heron Lane Wwtw, Stockport Road, Mossley, Ashton-Under-Lyne, OL5 0RS	Tributary of River Tame	95 m	east	06/12/2018
01OLD0083	Sewer storm overflow – water company	Royal George Ps, Oldham, Greater Manchester	-	174 m	north-east	01/04/1991, revoked 31/12/1994 01/01/1995, revoked 31/03/2020
016950639	Pumping station – water company	Armit Rd (Grasscroft) CSO Ps, Armit Road, Greenfield, Oldham, Greater Manchester, OL3 7LW	River Tame	201 m	north-east	27/08/2021
	Sewer storm – water company			201 m		
				245 m		01/04/1991, revoked 26/08/2021
01OLD0060	Treated effluent – water company	Armit Road SSO, Oldham, Greater Manchester	River Tame	241 m	north	15/09/1993, revoked 15/09/1993

Surface water abstractions

The data from Groundsure¹⁹ indicates there are no surface water abstractions within 250 m of the site.

11.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure¹⁹ indicates that the maximum radon potential on the site is between 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bg m⁻³.

11.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure¹⁹ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 11-9.

Table 11-9 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal mining areas	The site is located in a coal mining area.
Non-coal mining features	There is one non-coal mining area identified on-site, for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There is one other brit pit within 250 m of the site. This is located 188 m west. It is a surface mineral working, for sandstone, but at date of entry, has ceased to extract minerals.
Surface ground workings	There is one surface ground workings feature on-site. There are 20 other surface ground workings features within 250 m of the site. Details are provided in Table 11-10.
Underground workings	There are no underground workings on-site or within 250 m of the site.

Category	Summary
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 11-10 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 11-10 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1854-1992
Unspecified pit	3 m	north	1906-1956
Unspecified ground workings	37 m	south-west	1906-1918
Cuttings	40 m	north	1923
Ponds	53 m	north-east	1891-1956
Refuse heap	93 m	east	1918-1938
Sewage works	101 m	north-east	1904-1970
Cuttings	115 m	north-east	1906
Sewage works	138 m	north	1906-1938
Sandstone quarry (disused)	142 m	west	1854-1992
Sewage works	143 m	north-east	1930
Canal	161 m	east	1891-1992
Bricks works	175 m	east	1891
Old sandstone quarry	224 m	north	1854-1938
Ponds	231 m	north-west	1891
Unspecified ground workings	231 m	north	1891-1938
Refuse heap	239 m	east	1923-1956
Ponds	241 m	north-west	1891
Reservoir	246 m	north-west	1956-1992
Unspecified heap	248 m	south	1904

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure¹⁹ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites have been provided in Table 11-11, however not all licence details have been provided by Groundsure.

Table 11-11 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Landfill and waste summary

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
Historical Landfill	-	Commercial	0 m	On-site	-	-
Historical Landfill	-	Commercial	58 m	south	-	-
Historical Landfill	Woodend Mills	Inert	117 m	south-east	24/01/1992	Surrendered: 11/03/1993
Historical Landfill (BGS Records)	Midge Hill, Mossley	N/A	120 m	south-west	-	-
Historical Landfill	Mossley Holder Station	Inert, Industrial	154 m	east	04/11/1987	Surrendered: 20/09/1989
Historical Landfill	Quick Edge Quarry	-	141 m	north-west	-	-
Waste Exemptions	Unit E310, Warmco Industrial Estate, Manchester Road, Mossley, OL5 9AY	Storage of waste in a secure place	229 m	south	-	-

11.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site

11.9 Sensitive land uses

The data from Groundsure¹⁹ indicates that a site of special scientific interest (SSSI) is located 242 m south-east of the site. The SSSI is associated with the Huddersfield Narrow Canal. The site is also located within a SSSI impact zone. There are no other sensitive land uses, including Ramsar or areas of conservation within 250 m of the site.

11.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are two pollution incidents reported by Groundsure¹⁹ within 250 m of the site and a summary has been provided in Table 11-12.

Table 11-12 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Contaminated water	22 m	north-east	Category 4 (no Impact)	Category 4 (no Impact)	Category 3 (minor)	19/05/2001
Contaminated water	160 m	west	Category 4 (no Impact)	Category 3 (minor)	Category 4 (no Impact)	14/01/2002

Pollution prevention and controls

The data from Groundsure¹⁹ indicates there are not Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure¹⁹ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure¹⁹ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure¹⁹ indicates there are no recent industrial land uses on-site. There are seven recent industrial land uses within 250 m of the site. A summary has been provided in Table 11-13.

Table 11-13 - Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
N C S Forklifts Ltd	Industrial products	Lifting and handling equipment	31 m	east
Tame Valley Steelstock Ltd	Industrial products	Metals, manufacturers, fabricators and stockholders	31 m	east
Park Mill Ind Est	Industrial features	Business parks and industrial estates	62 m	east
Electricity substation	Infrastructure and facilities	Electrical features	109 m	east
M D R Autos	Repair and servicing	Vehicle repair, testing and servicing	117 m	south-west
Howarth Flooring Contractors Ltd	Construction services	Construction completion services	142 m	east
Pump house	Industrial features	Water pumping stations	159 m	north-east
Howarth flooring contractors ltd	Construction services	Construction completion services	161 m	south-east
Quick quarry (disused)	Extractive industries	Unspecified quarries or mines	178 m	west
Gas governor station	Infrastructure and facilities	Gas features	192 m	east
Electricity substation	Infrastructure and facilities	Electrical features	230 m	south-east
G s w plastics ltd	Industrial products	Rubber, silicones and plastics	232 m	south

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Tame Valley Steelstock Ltd	Industrial products	Metals manufacturers, fabricators and stockholders	240 m	south
Gas governor station	Infrastructure and facilities	Gas features	244 m	south-east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure¹⁹.

Contaminated land designations

According to Groundsure¹⁹, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

11.11 Site area reconnaissance

A site walkover was undertaken on 16 August 2024 by two AtkinsRéalis Environmental Scientists. A summary of the observations made during the visit is provided as follows.

Table 11-14 – Heron Lane site Compound and Wrights Mill Overbridge (mvl3/20) reconstruction - Site walkover record

Item	Description
Location	<p>The site is located on Third Party land north of Mossley, Greater Manchester. The site is off-track with national grid reference SD 97839 03619 and What3Words of packing.cookbooks.topped.</p> <p>The compound covers total area of 2.6 Ha and is divided into three areas: a section east of the railway, a large area south-west of the railway and a smaller area north-west of the railway.</p> <p>Heron Lane bounds the west and south-west of the site, with access off Midge Hill Lane. The railway bisects the site in an approximately north-south direction. The north-east of the site is bound by a public footpath, which continues to the west through the site, bisecting the smaller north-western area from the larger south-west compound area and joining Midge Hill Lane.</p>

	The whole site generally slopes from west to east with a change of elevation of approximately 50 m.
Description of current use/ activities	<p>The site as a whole is predominantly grazing pasture. Livestock were present in the area east of the railway.</p> <p>The south-west site area is used for storage (farm equipment), as well as grazing, and there appears to be some quarrying and storage of stone in the west of this site area.</p> <p>A public footpath runs approximately west to east, before crossing over a bridge over the railway, and then turning north-east and bounding the north of the eastern site area.</p> <p>Heron Lane, which consists primarily of a gravel trackway in the west, and hardstanding in the east borders much of the west and south-west of the site.</p>
Fuel/chemical storage	No fuel or chemical storage was evident on the site.
Evidence of land contamination	<p>No evidence of land contamination was observed. Minor litter/fly tipping was observed in the east and south-west of the site of plastic fragments and a glass bottle respectively. Plastic fragments were also observed on the embankment bordering the west of the northern site area.</p> <p>An empty drum and plastic fragments were observed in the west corner of the site off Heron Lane, plus an approximately 1 m tall and 1.5 m by 3 m wide stockpile of broken tarmac.</p>
Invasive Species	Himalayan Balsam was noted in several locations along the public footpath, railway embankment and an embankment bordering the west of the northern site area.
Surface coverage	The site comprises dominantly agricultural fields of grass coverage (approximately 80%) plus trees and low shrubbery (approximately 15%). Heron Lane consists of some hardstanding (concrete and tarmac) and gravel (approximately 5% of the site) and the public footpath of gravel and soft vegetated cover.
Boundary Types	<p>The south-west site area is accessed from the east from Midge Hill Lane, which branches south to form Heron Lane. Heron Lane is accessed via a metal gate approximately 4 m wide by 1.5 m tall. This site area is bound in the north and east by a wire livestock fence with wood posts and barbed wire, approximately 1 m tall, with the public footpath to the north. Heron Lane bounds the west and south-west of this site area. In the south, the site is bordered by an approximately 1 m tall wire livestock fence with wood posts and barbed wire</p> <p>The east site area is accessed from the south off Heron Lane (on the eastern side of the viaduct) by two metal gates approximately 4 m</p>

	<p>wide by 1.5 m tall. A wire livestock fence with wood posts and barbed wire, approximately 1 m tall, borders the west of the area with the railway embankment and railway approximately 1.5 to 2 m above in elevation. The public footpath, accessed from the field by a wooden stile, borders this site area to the north, separated from the site by an approximately 1 m tall wire livestock fence with wood posts and barbed wire. The site border is open to the east.</p> <p>The north-west site area is accessed from the public footpath on its south border via a wooden stile. The south and west of this site area are bordered by an approximately 1 m tall wire livestock fence with wood posts and barbed wire. In the west, beyond the border there is an embankment of what appears to be Made Ground (mixed gravel and brick fragments) with shrubbery and an outflow pipe (likely of surface or ground water). The east of the site is bordered by a stone wall, approximately 1 m tall, collapsed in areas and patched with wire livestock fencing, barbed wire and wood posts of the same height. The railway embankment is behind the wall. The northern border of this site area is an open field.</p>
Surface Water Features	<p>What appears to be an ephemeral pond was evident to the east of Heron Lane (where it branches from Midge Hill Lane) in the north-west corner of the south-west site area. The pond was approximately 5 m long by 2-3 m wide. A minor amount of lying water was observed at the base, with saturated mud.</p>

11.12 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and potential/future uses following the proposed reconstruction of the existing overbridge and use of the site as a construction compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Commercial landfill
- Off-site:
 - Historical features surrounding the site including:
 - Unspecified mills, pits and foundries;
 - Cotton Mills;
 - Electricity substations;
 - Garages;
 - Sewage works;
 - Iron works;
 - Gas works;
 - Gasometers;
 - Refuse heaps;
 - Quarries;
 - Settling tanks;
 - Pumping stations; and
 - Brick works.
 - Current features surrounding the site including:
 - Pumping station;
 - Construction services;
 - Gas governors; and
 - Electricity substations.
 - Historical landfill [58 m south, 117 m south-west, 154 m east, 141 m north-west].

- Pollution incidents [22 m north-east, 160 m west].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
 - Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Secondary A bedrock aquifer; and
 - Secondary (Undifferentiated) superficial aquifer.
 - Surface water:
 - River Tame; and
 - Huddersfield Narrow Canal west section.

- Property and Services:
 - On-site: structures (overbridge) and services, construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 11-15 - Heron Lane site Compound and Wrights Mill Overbridge (MVL3//20) reconstruction - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Commercial landfill Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i>	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – Construction workers <u>Property</u> – Compound related facilities Overbridge Off-site: <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, users of public open spaces.	Low	Severe	Moderate risk Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site. The site is currently predominantly grazing pasture and the land use is unlikely to be altered following the construction of the site, therefore it is unlikely will come into contact with contaminants in areas of the site. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses in the north/northwest area of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
<i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation of vapours Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Property and Services</u> – Commercial businesses and residential properties.	Low	Medium	Moderate/low risk Landfill previously located on-site is a potential source of ground gas. Made Ground and infilled ground are anticipated to be present on the site, which may also be a source of ground gas however the landfill previously located on-site is considered to be the main potential source of ground gas. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. However, welfare cabins are likely to have a void between the floor

Inhalation of asbestos fibres.		Low	Severe	<p>and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.</p> <p>It is also assumed that after construction of the railway is completed, there will be no buildings on-site for the accumulation of gas.</p>
Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service		Low	Medium	<p>Moderate risk</p> <p>Former buildings on-site which may have been demolished increase the likelihood of asbestos being present. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk.</p> <p>The majority of site is currently grassed with small areas of hardstanding and rough vegetation. During the site's use as a construction compound it is likely to comprise hardstanding or gravel which will break the direct exposure pathway.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>Moderate/low risk</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer and for the superficial aquifers</p> <p>If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from</p>

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	pipes/trenches, piled foundations.				precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – River Tame Huddersfield Narrow Canal west section	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to surface waters. Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the east, towards the River Tame. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources: Historical features surrounding the site including: Bridge End Foundry; Wright Mill; Cotton Mills; Unspecified tanks; Bankside Iron works; Electricity substations; Gas works; and	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>Human Health</u> – On-site: Construction workers <u>Property –</u> Compound related facilities Overbridge	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential

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<p>Sandstone quarries. Current features surrounding the site including:</p>				<p>for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.</p>
<p>Industrial products; Electricity substations; and Auto repairs and servicing. Historical landfill: Woodend Mills; Midge Hill; Mossley Holder Station; Quick Edge Quarry; Pollution incidents:</p>	<p>Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.</p>
<p>Sewage materials; Inert materials and wastes <i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>	<p>Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk Historical landfills are located around the site which could be a potential source of ground gas. No coal seams are found around the site. There have been two pollution incidents involving sewage materials and inert materials and waste around the site, the nearest of which occurred 22 m north-east.</p>

11.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If

risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

12. BASELINE FOR ARMIT ROAD SITE COMPOUND

12.1 Site history

Table 12-1 provides a summary of the historical development at the Armit Rd site and the surrounding 250 m buffer area. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²⁰.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 12-1 – Armit Road site compound - Historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1891-1938	0 m	on-site
Sewage Works	1904-1956	0 m	on-site
Lower Grove Mill (Cotton) Lists dyeing and bleaching from 1922	1854-1938	0 m	on-site
Unspecified Quarry	1891-1992	1 m	north-west
Chimney	1970-1992	4 m	north-east
Tanks	1933-1938	51 m	south-west
Unspecified Heap	1891-1970	56 m	north-west
Unspecified Tanks	1938	58 m	south-west
Bricks Works	1891	65 m	east
Old Sandstone Quarry	1854-1938	74 m	south-west
High Grove Mill (cotton)	1854-1938	78 m	north-east
Unspecified Heap	1918-1956	93 m	north-west
Cuttings	1906-1918	108 m	north-east
Railway Sidings	1891-1970	108 m	north-east
Unspecified Tank	1906-1933	118 m	south-west
Unspecified Tank	1918-1923	122 m	north-east

²⁰ Groundsure, 2025. Enviro + Geo Insight (GS-LHE-639-WE6-VAS)

Feature	Date	Distance from site boundary	Direction from site boundary
Settling tanks	1909-1954	124 m	south-west
High Grove Works (soap and detergents)	1956-1982	125 m	north-east
Refuse Heap	1918-1923	129 m	south
Cuttings	1854-1992	136 m	north
Cuttings	1906	137 m	south-west
Royal Geroge Mills	1854-1992	144 m	east
Railway Station	1918-1938	154 m	north-east
Sewage Tank	1955-1978	154 m	east
Cuttings	1854-1992	168 m	north-west
Cuttings	1854-1992	181 m	south-west
Cotton Mill	1854-1956	187 m	south-west
Unspecified Ground Workings	1906-1918	197 m	south-west
Unspecified Ground Workings	1930	210 m	north-east
Unspecified Tank	1906-1978	219 m	east
Tunnel	1854-1891	229 m	north-west
Electricity Substation	1978-1990	239 m	north-west
Refuse Heap	1930-1938	239 m	south
Gravel Pit	1918	240 m	south
Electricity Substation	1954	243 m	south-west
Tanks	1906-1978	243 m	east

12.2 Previous ground investigations

Description of investigation

An intrusive ground investigation was undertaken by Structural Soils Ltd. in March 2018²⁰ around the existing bridge structures, MVL3/25, MVL3/26 and viaduct MVL3/31, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Two of the locations are within 250 m of the site and have been summarised in Table 12-2 and the investigation locations are displayed in Figure 12-1.

Table 12-2 - Armit Road site compound - Summary of 2018 investigation

Item	No. undertaken
Number of boreholes	None
Number of trial pits	Two
PID* testing undertaken	None
Number of soil samples tested	None
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	



Figure 12-1 - Armit Road site compound - Summary of investigations

Ground conditions

Table 12-3 summarises the ground conditions encountered during the ground investigation.

Table 12-3 - Armit Road site compound - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Dark grey slightly sandy angular to subangular fine to coarse gravel of granite >25 mm (Clean ballast)	0.17-0.21 (start of borehole below rail line).	0.47-0.76
	Dark grey slightly sandy gravel. Gravel is very angular to subangular fine to coarse of granite >25 mm (Clean ballast)		
	Dark greyish black very gravelly sand. Gravel is subangular to subrounded fine to coarse of ash and granite (Very dirty ballast)		
Clay	Greyish brown slightly gravelly sandy clay. Gravel is angular to subangular fine to medium of sandstone.	0.47	0.82

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic material is displayed in Table 12-4.

Table 12-4 - Armit Road site compound - Summary of anthropogenic materials observed within the logs

Exploratory Hole	Depth (m)	Comment	Strata
TP2004	0.61 – 0.76	Ash inclusions	Made Ground

12.3 Published geology

A summary of the published geology relevant to the Armit Road Site Compound and vehicle access site is provided below. The data has been sourced by Groundsure²¹ and British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is recorded on-site. Made Ground is also recorded within 250 m of the site. Made Ground may be associated with sewage works, mills, tanks and electricity substations.

Superficial deposits

The 1:10,000 scale published geology maps indicate that Alluvium is recorded on-site underlying the south of the site. Head deposits are recorded 219 m north-west, and Devensian Till is recorded 224 m south of the site.

Bedrock

The 1:10,000 scale published geology maps indicates that the Hebden Formations is recorded underlying the northern boundary of the site. Upper Kinderscout Grit is recorded underlying the remainder of the site. There are three other bedrock geology designations within 250 of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 12-5. Figure 12-2 presents bedrock formations up to 250 m from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 12-5 - Armit Road site compound - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional details
Hebden Formation	0 m 247 m	on-site south-west	Mudstone and siltstone
Upper Kinderscout Grit	0 m 14 m 247 m	on-site north-west south-west	Sandstone
Marsden Formation	153 m 175 m	north-west north	Mudstone and siltstone
Fletcher Bank Grit	244 m	north-west	Sandstone

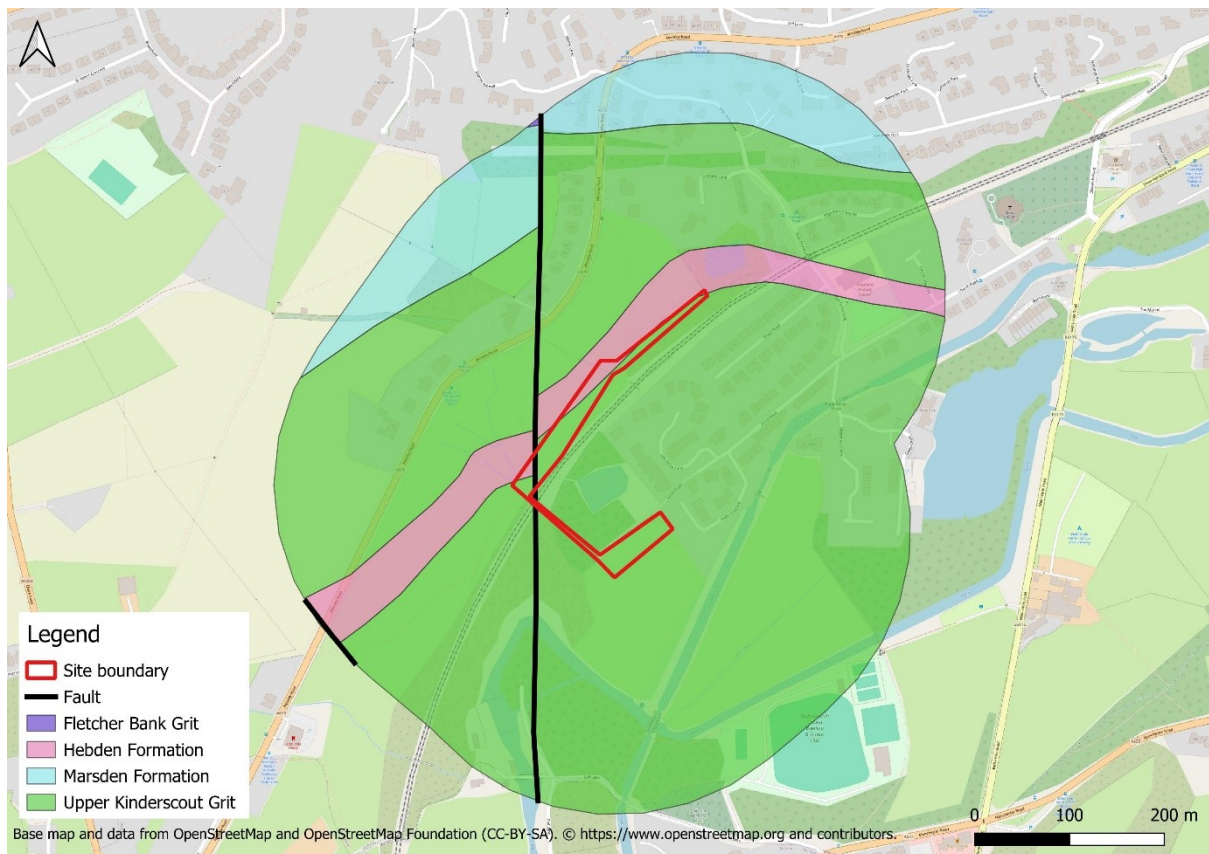


Figure 12-2 - Armit Road site compound - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is one bedrock fault on-site. There is one other bedrock fault within 250 m of the site, located 247 m south-west. Faults are visible in Figure 12-2.

12.4 Hydrogeology

Superficial aquifers

The data from Groundsure²¹ indicates that there is a secondary A superficial aquifer in the south of the site. There is a secondary (Undifferentiated) aquifer recorded in the north of the site.

Secondary A aquifers are defined by the Environment Agency as “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.”

Secondary (Undifferentiated) aquifers are defined as “where it is not possible to attribute either category A or B to a rock type. In general, these layers

have previously been designed as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.”

Bedrock aquifers

The data from Groundsure²¹ indicates that the secondary A aquifer underlies the entire site and surrounding area.

Groundwater vulnerability

Groundsure²¹ indicates that the groundwater vulnerability is high for bedrock aquifer and the superficial aquifers. A high classification is assigned to areas which are “able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.”

Groundwater source protection zones

The data from Groundsure²¹ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²¹ indicates that there are no groundwater abstractions within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²¹ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

12.5 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²¹ as an unnamed watercourse and is located on the site. A summary of all surface watercourses (rivers, lakes, canals and coastal and transitional waters) within 250 m of the site has been provided in Table 12-6.

Table 12-6 - Armit Road site compound - Surface watercourses

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Unnamed watercourse	On ground surface level	0 m	on-site	-
Unnamed pond	-	13 m	north-east	

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Unnamed pond	Man-made fishing pond	29 m	south-east	-
Unnamed watercourse	On ground surface level	32 m	north-east	-
Huddersfield Narrow Canal west section	Canal	68 m	south-east	Moderate
Tame (Chew Brook to Swineshaw Brook)	River	98 m	south-west	Moderate
Mill Stream	On ground surface level	142 m	south-east	-

Surface water abstractions

The data from Groundsure²¹ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

Surface water discharge consents

The data from Groundsure²¹ indicates there are no licensed discharge to surface water features on-site. There are five licensed discharge to surface water features within 250 m of the site. A summary of surface water discharge consents is provided in Table 12-7. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 12-7 - Armit Road site compound - Surface water discharge consents

Permit number	Address	Receiving water	Distance from site boundary	Direction from site boundary	Effective date
016950639	Armit Rd (Grasscroft CSO PS), Armit Road, Greenfield, Oldham, Greater Manchester, OL37LW	River Tame	44 m	south-west	01/04/1991
01OLD0060	Armit Road SSO, Oldham,	River Tame	51 m	south-west	15/09/1993

Permit number	Address	Receiving water	Distance from site boundary	Direction from site boundary	Effective date
	Greater Manchester				
016950639	Armit Rd (Grasscroft CSOPS), Armit Road, Greenfield, Oldham, Greater Manchester, OL37LW	River Tame	84 m	south-west	27/08/2021
01OLD0083	Royal George PS, Oldham, Greater Manchester	-	103 m	south-west	01/04/1991
		-	103 m	south-west	01/01/1995

Surface water abstractions

The data from Groundsure²¹ indicates there are no surface water abstractions within 250 m of the site.

12.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²¹ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

12.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²¹ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 12-8.

Table 12-8 - Armit Road site compound - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.

Category	Summary
Coal Mining Areas	The site is located within a coal mining area.
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and underground mineral workings)	There are no brit pits on-site or within 250 m of the site.
Surface Ground Workings	There are two surface ground workings features on-site. There are 32 other surface ground workings features within 250 m of the site. Details are provided in Table 12-9.
Underground Workings	There are no underground workings on-site. There is one other underground workings within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 12-9 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 12-9 - Armit Road site compound - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Cuttings	0 m	on-site	1904-1938
Sewage works	0 m	on-site	1923-1938
Cuttings	1 m	south-east	1891-1918
Unspecified quarry	2 m	north-west	1904-1938
Pond	3 m	north-east	1891-1970
Pond	14 m	north	1854-1970
Unspecified pit	18 m	north-west	1904-1938
Reservoir	19 m	north	1891-1992
Unspecified pit	20 m	north-west	1906-1992

Name	Distance from site boundary	Direction from site boundary	Date
Reservoir	21 m	north-east	1904-1992
Canal	55 m	south-east	1891-1992
Unspecified heap	56 m	north-west	1891
Bricks works	65 m	east	1891
Unspecified heap	73 m	north-west	1923-1970
Old sandstone quarry	74 m	south-west	1854-1938
Unspecified heap	78 m	north	1904-1956
Sewage works	100 m	south-west	1904-1956
Cuttings	108 m	north-east	1906-1918
Refuse heap	129 m	south	1918-1923
Cuttings	136 m	north	1854-1956
Cuttings	137 m	south-west	1906
Cuttings	168 m	north-west	1891-1992
Cuttings	181 m	south-west	1854-1923
Pond	194 m	south-west	1891-1956
Cuttings	197 m	south-west	1956-1992
Unspecified ground workings	197 m	south-west	1906-1918
Cuttings	202 m	south-west	1904-1938
Unspecified ground workings	210 m	north-east	1930
Pond	215 m	east	1854
Tunnel	229 m	north-west	1891
Refuse heap	239 m	south	1930-1938
Gravel pit	240 m	south	1918
Water body	242 m	east	1891
Reservoir	249 m	east	1904-1938

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²¹ records landfills/waste management facilities within 250 m of the site. One historical landfill is recorded within 250 m of the

site, located 66 m north-west. However no additional details have been provided by Groundsure.

12.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

12.9 Sensitive land uses

The data from Groundsure²¹ indicates there are no sensitive land uses, including sites of special scientific interest (SSSIs), Ramsar or areas of conservation within 250 m of the site. The site is located within a SSSI impact zone.

12.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There is one pollution incident reported by Groundsure²¹ within 250 m of the site and a summary has been provided in Table 12-10.

Table 12-10 - Armit Road site compound - Pollution incidents

Type	Distance from site boundary	Direction from site boundary	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Oils and fuel	242 m	east	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	24/03/2001

Pollution prevention and controls

The data from Groundsure²¹ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²¹ indicates there is one Control of Major Accident Hazard (COMAH) site/planning hazardous substance consents within 250 m of the site. There is a non-active list 1 dangerous substance (mercury and cadmium) recorded 104 m north-east.

Radioactive substances

The data from Groundsure²¹ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²¹ indicates there are no recent industrial land uses on-site. There are six recent industrial land uses within 250 m of the site. A summary has been provided in Table 12-11.

Table 12-11 - Armit Road site compound - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Chimney	Industrial features	Chimneys	8 m	north-east
Pump house	Industrial features	Water pumping stations	118 m	south-west
Electricity substation	Infrastructure and facilities	Electrical features	192 m	south-east
Gas governor station	Infrastructure and facilities	Gas features	195 m	south-east
Electricity substation	Infrastructure and facilities	Electrical features	244 m	north-west
Sewage pumping station	Infrastructure and facilities	Waste storage, processing and disposal	248 m	east

Active and current petrol stations

There are no active or current petrol stations recorded within 250 m of the site, as indicated by Groundsure²¹.

Contaminated land designations

According to Groundsure²¹, there are no sites designated as contaminated land on-site or within 250 m of the site under Part 2A of the Environmental Protection Act 1990.

12.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or

discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of the existing site and future use of the site as a construction compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical developments on the site including:
 - Sewage works; and
 - Lower Grove cotton mill.
- Off-site:
 - Historical developments surrounding the site including:
 - Unspecified/sandstone quarries;
 - Tanks;
 - Brick works;
 - High Grove cotton mill;
 - High Grove works;
 - Refuse heap;
 - Royal George Mills;
 - Railway station; and
 - Electricity substations.

- Current features surrounding the site including:
 - Water pumping station;
 - Electricity substation;
 - Gas governor station; and
 - Sewage pumping station.
- Historical landfill:
 - Unknown landfill [66 m north-west]
- Pollution incident:
 - Oils and fuels [242 m east].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:

- Resident and occupiers of commercial/industrial premises; and
 - Users of public open spaces.
- Controlled Waters
 - Groundwater:
 - Secondary A superficial aquifer;
 - Secondary (Undifferentiated) superficial aquifer; and
 - Secondary A bedrock aquifer.
 - Surface water:
 - On-site: Unnamed watercourse;
 - Off-site: Ponds, unnamed watercourse, Huddersfield Narrow Canal west section, River Tame, Mill Stream.
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and

- inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that all personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 12-12 - Armit Road site compound - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Historical developments on the site including: Sewage works; and Lower Grove cotton mill.	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – Construction workers Future users of the site. <u>Property –</u> Compound related facilities. Overbridge	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site. The site is currently predominantly grazing pasture, and the land use is unlikely to be altered following the construction of the, therefore it is unlikely will come into contact with contaminants in areas of the site. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Residential properties are present to the north of the site; therefore dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation of vapours Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	Off-site: <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, users of public open spaces. <u>Property and Services –</u> Commercial businesses and residential properties.	Low	Medium	Moderate/low risk Made Ground and infilled ground are anticipated to be present on the site, which may be a source of ground gas. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. However, welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk. It is also assumed that after construction of the railway is completed, there will be no buildings on-site for the accumulation of gas.

Inhalation of asbestos fibres.		Low	Severe	Moderate risk Former buildings on-site which may have been demolished increase the likelihood of asbestos being present. Based on the potential presence of asbestos in made ground, which is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk. The site is currently grassed with rough vegetation. During the site's use as a construction compound it is likely to comprise hardstanding or gravel which will break the direct exposure pathway. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.
Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer Superficial secondary A aquifer Superficial secondary (Undifferentiated) aquifer	Low	Medium	Moderate/low risk The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer and for the superficial aquifers. If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Leaching or dissolution of contaminants in unsaturated soils and subsequent migration	<u>Surface Water Controlled Waters</u> –	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to surface waters.

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	Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	Unnamed watercourses Huddersfield Narrow Canal west section River Tame Mill Stream			Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the south-east, towards the River Tame. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Unspecified/sandstone quarries; Tanks; Brick works; High Grove cotton mill; High Grove works; Refuse heap; Royal George Mills; Railway station; and Electricity substations. Current features surrounding the site including:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>Human Health</u> – On-site: <u>Human Health</u> – Construction workers <u>Property –</u> Compound related facilities. Overbridge	Unlikely	Medium	Low risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE, and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.

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Water pumping station; Electricity substation; Gas governor station; and Sewage pumping station. Historical landfill: Unknown landfill [66 m north-west]	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.	Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.
Pollution incidents: Oils and fuels [242 m east]	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	Low	Medium	Moderate/low risk One historical landfill is located close to the site, which could be a source of ground gas able to migrate to the site. No coal seams are found around the site. There is one pollution incident, located 242 m east of the site, which based on the distance from the site is unlikely to pose a risk.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>				

12.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If

risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

13. BASELINE FOR OAKLANDS ROAD SITE COMPOUND AND GREENFIELD SITE COMPOUND, INCLUDING BRIDGE WORKS (MVL3/27B AND MVL3/28)

This section covers the relevant baseline data for Royal George Overbridge Works MVL3/25, Oaklands Road Compound, Replacement Parking, Oldham Road Overbridge and New Footbridge Works MVL3/27, MVL 3/28 and Greenfield Compound.

13.1 Site history

Table 13-1 provides a summary of the historical development at the sites and the surrounding 250 m buffer areas which may represent potential sources of contamination. The history of the sites and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²¹.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 13-1 - Oaklands road site compound and greenfield site compound, including bridge works - Summary of the historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1891-1992	0 m	on-site
Railway Building	1891-1948	0 m	on-site
Railway Sidings	1891-1956	0 m	on-site
Railway Station	1891-1992	0 m	on-site
Unspecified Wharf	1854	0 m	on-site
Electricity Substation	1951- 1990	6 m	south-west
Unspecified Ground Workings	1930	13 m	north-west
Frenches Dye Works	1929-1956	15 m	east
Unspecified Tank	1906-1909	15 m	north-west
Bricks Works	1891-1970	16 m	south-east

²¹ Groundsure 2024. Enviro + Geo Insight (GS-LQI-WSM-6RZ-384)

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Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Tank	1904-1951	16 m	north-west
Railway Sidings	1891-1956	22 m	north-west
Unspecified Quarry	1891-1982	26 m	north
Unspecified Wharf	1923-1938	29 m	south
Railway Building	1904-1948	31 m	north
Unspecified Pit	1891	35 m	north
Urban District Council Sewage Works	1929-1948	37 m	east
Unspecified Tank	1952-1957	45 m	south-east
Wellington Mill	1891-1992	65 m	south-east
Unspecified Tank	1906-1952	69 m	east
Railway Sidings	1891-1970	84 m	west
Unspecified Works	1904-1948	89 m	east
Unspecified Tank	1951-1990	90 m	north-west
Railway Building	1891	94 m	west
Unspecified Tanks	1904-1958	94 m	north-east
Garage	1978-1990	98 m	north-west
Sewage Works	1906-1992	98 m	south-east
Cuttings	1906-1918	104 m	west
Unspecified Pit	1933-1938	118 m	north-west
Digestion Tank	1951-1992	132 m	south-east
Unspecified Pits	1938	145 m	east
Sewage Works	1906- 1992	148 m	south
Refuse Heap	1956	152 m	south
Unspecified Mill	1891-1938	160 m	west
Electricity Substation	1978-1999	164 m	south-east
Unspecified Mills	1938-1992	168 m	south-east
Unspecified Works	1956-1982	173 m	west
Cuttings	1904	174 m	east
Unspecified Tank	1952	179 m	south-east
Urban District Council Sewage Works	1929	179 m	south-east
Unspecified Works	1904-1948	193 m	south

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Ground Workings	1904-1982	197 m	south-east
Unspecified Disused Quarry	1977-1989	204 m	north-west
Unspecified Heaps	1956-1970	206 m	south-east
Sludge Tanks	1982-1999	211 m	south-east
Unspecified Ground Workings	1970-1992	216 m	south-east
Refuse Heap	1956	217 m	south-east
Garage	1991-1999	221 m	south-east
Unspecified Ground Workings	1891	221 m	west
Unspecified Ground Workings	1929-1982	224 m	south-east
Unspecified Tank	1952	232 m	south-east
Unspecified Quarry	1929-1989	237 m	north
Settling Tanks	1982-1999	241 m	south-east
Unspecified Heaps	1929-1982	242 m	south

13.2 Previous ground investigations

Description of investigation

An intrusive ground investigation was undertaken by Structural Soils Ltd. In March 2018²⁰ around the existing bridge structures, MVL3/25, MVL3/26 and viaduct MVL3/31, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Four of the locations are within 250 m of the site and have been summarised in Table 13-2 and the investigation locations are displayed in Figure 13-1.

Table 13-2 - Oaklands road site compound and greenfield site compound, including bridge works - Summary of investigation

Item	No. undertaken
Number of boreholes	None
Number of trial pits	Four
PID* testing undertaken	None
Number of soil samples tested	None

Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	

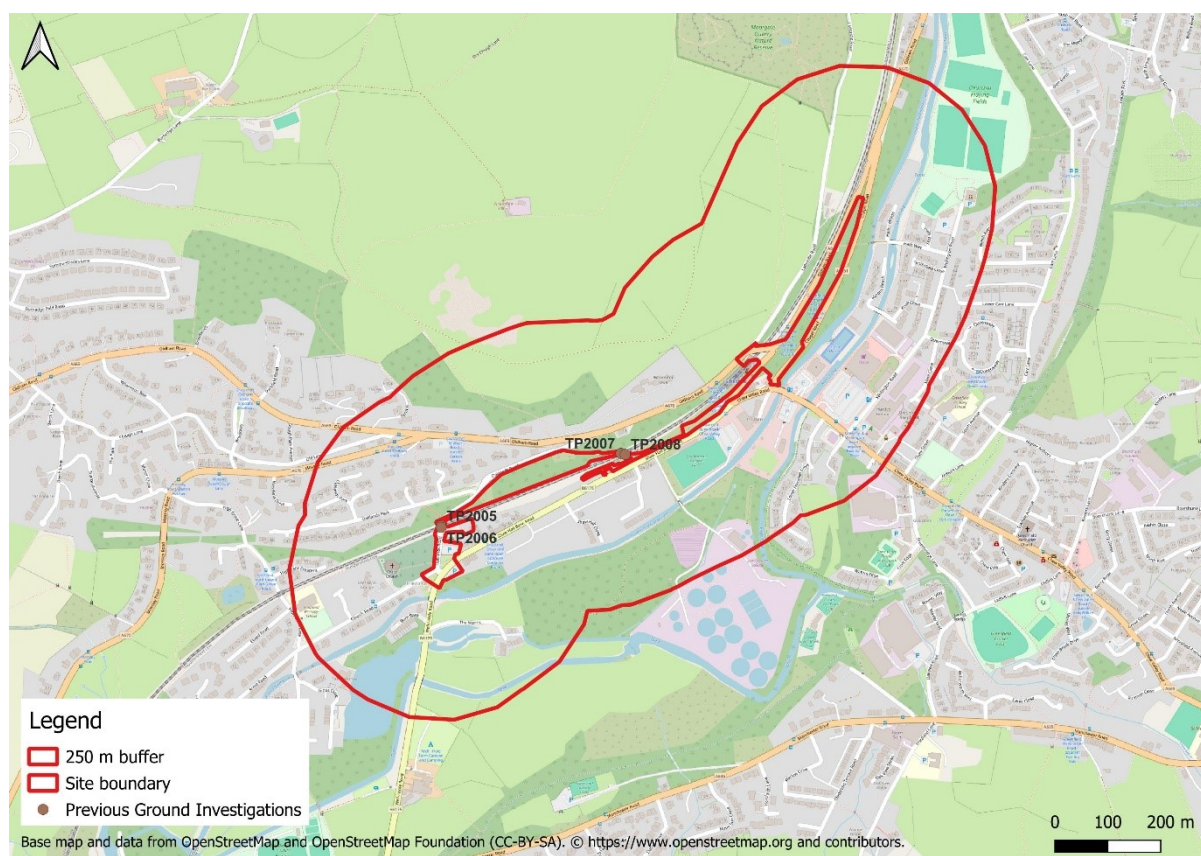


Figure 13-1 - Previous ground investigations

Summary of ground conditions

Table 13-3 summarises the ground conditions encountered during the ground investigation.

Table 13-3 - Oaklands road site compound and greenfield site compound, including bridge works - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Dark greyish black very gravelly sand. Gravel of ash and ballast. (Very dirty ballast).	0.12 - 0.19 (start of borehole below rail line)	0.54 – 0.73
	Dark grey slightly sandy gravel. Gravel of granite. (Clean ballast)		
	Dark greyish black very sandy gravel. Gravel of ash and granite. (Dirty ballast)		
	Dark greyish black very gravelly sand. Gravel of ash and granite. (Very dirty ballast).		
	Dark grey slightly sandy gravel. Gravel of granite (Ballast)		
	Dark greyish black very sandy gravel. Gravel of ash and granite. (Dirty ballast)		
	Dark greyish black very gravelly sand. Gravel of granite and ash. (Very dirty ballast)		
Sandstone	Sandstone Bridge Deck	0.72 - 0.73	0.74

Groundwater was encountered in TP2005 and TP2006 at a depth of 0.25 m bgl. A slight hydrocarbon odour was noted in TP2005 at a depth of 0.30 m bgl, and a strong hydrocarbon odour was noted in TP2006 at the same depth.

A summary of the observed anthropogenic materials is displayed in Table 13-4.

Table 13-4 - Oaklands road site compound and greenfield site compound, including bridge works - Summary of anthropogenic materials observed

Exploratory Hole	Depth (m)	Comment	Strata
TP2005	0.19 – 0.54	Ash inclusions	Made Ground
TP2006	0.20 – 0.55		
TP2007	0.49 – 0.73		
TP2008	0.47 – 0.72		

13.3 Published geology

A summary of the published geology relevant to the Oaklands Road Site Compound and Greenfield Site Compound, including bridge works (MVL3/27B and MVL3/28) is provided below. The data has been sourced from Groundsure²² and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is mapped as being present on-site. Made Ground may be associated with historical development including railway buildings, sidings, and stations, unspecified ground workings, unspecified tanks and unspecified mills.

Superficial deposits

The 1:50,000 scale published geology maps indicate that Alluvium is recorded in the south-east of the site. Alluvium is also recorded off-site to the south-east. Devensian Till is recorded 150 m east.

Bedrock

The 1:10,000 scale published geology indicates there are three bedrock geology designations on-site. There are five other bedrock geology designations within 250 m of the site.

A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 13-5. Figure 13-2 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 13-5 - Oaklands road site compound and greenfield site compound, including bridge works - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional Details
Hebden Formation	0 m 26 m 78 m	on-site east south	Mudstone and siltstone
Lower Kinderscout Grit	0 m	on-site	Sandstone
Marsden Formation	0 m 191 m	on-site north-west	Mudstone and siltstone
Upper Kinderscout Grit	0 m 104 m 246 m	on-site south south-east	Sandstone
Fletcher Bank Grit	60 m 224 m	north-west north-west	Sandstone
Shale Grit	74 m	south-east	Sandstone

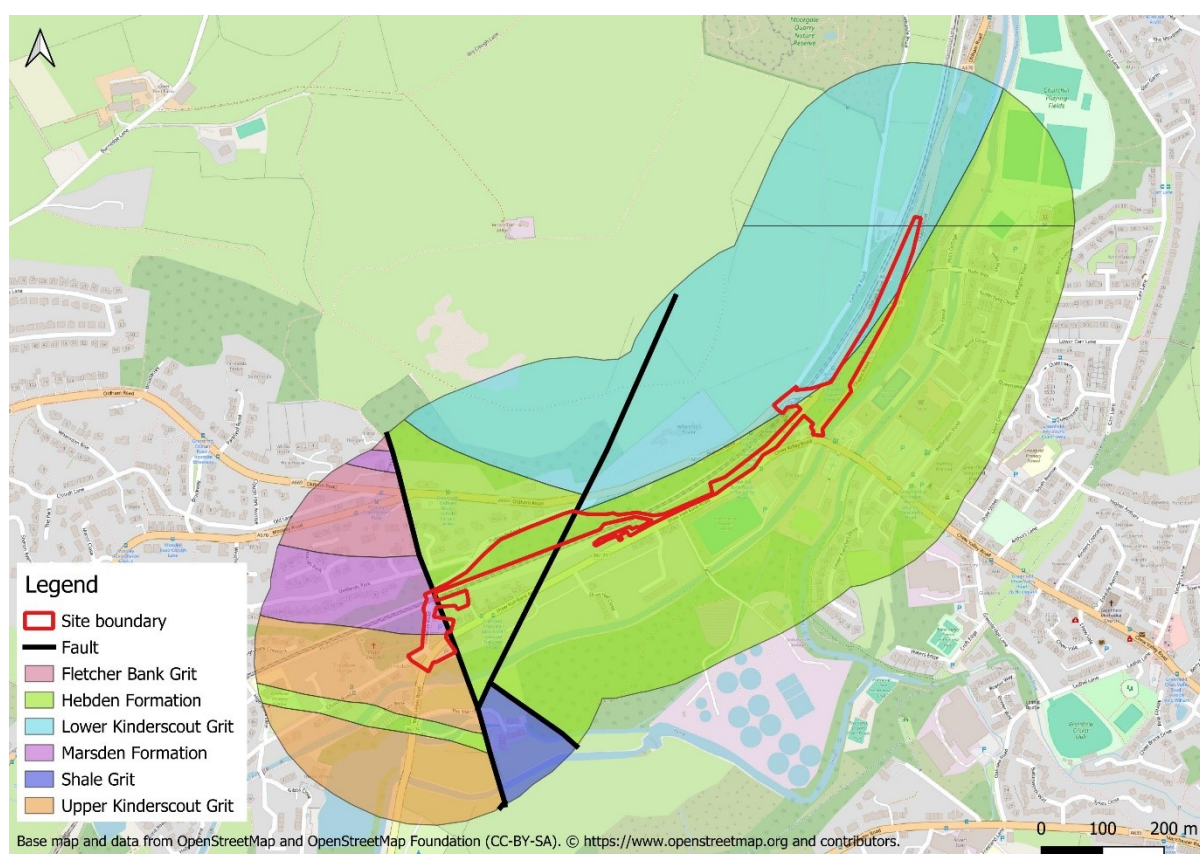


Figure 13-2 - Oaklands Road site compound and Greenfield site compound, Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is two bedrock fault on the site. There are two other bedrock faults within 250 m of the site. A summary is provided in Table 13-6. Faults are visible in Figure 13-2.

Table 13-6 - Oaklands road site compound and greenfield site compound, including bridge works - Summary of bedrock faults

Category	Description	Distance from the site boundary	Direction from the site boundary
Fault	Normal fault, inferred	0 m	on-site
Fault	Normal fault, inferred	0 m	on-site
Fault	Normal fault, inferred	74 m	south-east
Fault	Normal fault, inferred	246 m	south-east

13.4 Hydrogeology

Superficial aquifers

The data from Groundsure²² indicates that there is a secondary (Undifferentiated) superficial aquifer located on-site. This classification is assigned by the Environmental Agency when *“it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type”*.

There is also a secondary A aquifer located 4 m east of the site. The Environment Agency describes a secondary A aquifer as “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

Bedrock aquifers

The data from Groundsure²² indicates the presence of a secondary A bedrock aquifer underlying the site and surrounding area.

Groundwater vulnerability

Groundsure²² data indicates that the groundwater vulnerability ranges from low to high for the superficial aquifer, and medium to high for the bedrock aquifer vulnerability.

High groundwater vulnerability is assigned to “areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.”

Medium groundwater vulnerability is as an “intermediate between high and low vulnerability”.

Low groundwater vulnerability is assigned to “areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability”.

Groundwater source protection zones

The data from Groundsure²² and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²² indicates that there are no groundwater abstraction licenses on or within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²² indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

13.5 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²² as the Huddersfield Narrow Canal west section and is located 8 m south-east of the site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 13-7. There are nine surface water features within 250 m of the site.

Table 13-7 - Oaklands road site compound and greenfield site compound, including bridge works - Surface watercourses

Name of watercourse	Type	Distance from site	Direction from site	WFD overall classification
Huddersfield Narrow Canal west section	Canal	7 m	south-east	Moderate
Tame (Source to Chew Brook)	River	57 m	south-east	Moderate
Unnamed watercourse	Lake, loch or reservoir	87 m	south	-
Unnamed watercourse	On ground surface watercourse	110 m	west	-
Unnamed watercourse	On ground surface watercourse	137 m	south-east	-
Unnamed watercourse	Lake, loch or reservoir	151 m	south-west	-
Unnamed watercourse	Underground	141 m	south-east	-

Surface water discharge consents

The data from Groundsure²² indicates there are no licensed discharge to surface water features on-site. There are four surface water discharge consents within 250 m of the site. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 13-8 - Oaklands road site compound and greenfield site compound, including bridge works - Surface water discharge consents

Permit number	Address	Receiving water	Distance from site boundary	Direction from site boundary	Effective date
01OLD0141	Halls Cottage Ps, Greenfield, Greater Manchester	River Tame	74 m	east	01/01/1995
016982796	Halls Cottage Ps, Greenfield, Greater Manchester	River Tame	74 m	east	30/09/1994
01OLD0116	Mann SPS, Oldham, Greater Manchester	-	222 m	south-east	13/05/1993
0173/1911	Mann SPS, Greenfield, Near Saddleworth, Lancashire	River Tame	222 m	south-east	30/07/1993

Surface water abstractions

The data from Groundsure²² indicates there is one historical surface water abstraction within 250 m of the site. This was located 199 m south-west of the site on the River Tame and related to general use from 22 May 1998, with no expiry date available from Groundsure.

13.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²² indicates that the maximum radon potential on-site is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

13.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²² records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 13-9.

Table 13-9 - Oaklands road site compound and greenfield site compound, including bridge works - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal mining areas	The site is not located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site. There is one other non-coal mining area within 250 m of the site. This is located 241 m south-east. Both non-coal mining areas are for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There are two other brit pits within 250 m of the site. Both are surface mineral working, used for sandstone, however at date of entry, have ceased to extract minerals. They are located 63 m north and 82 m north.
Surface ground workings	There are two surface ground workings features on-site. There are 27 other surface ground workings features within 250 m of the site. Details are provided in Table 13-10 below.
Underground workings	There are no underground workings on-site or within 250 m of the site.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 13-10 provides further detail on the surface ground workings and the relative distance and direction from the site boundary.

Table 13-10 - Oaklands road site compound and greenfield site compound, including bridge works - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Cuttings	0 m	on-site	1891-1948
Unspecified Wharf	0 m	on-site	1854
Canal	2 m	east	1891-1992
Cuttings	5 m	north	1970-1992
Unspecified Ground Workings	13 m	north-west	1930
Bricks Works	16 m	south-east	1891
Pond	22 m	south-east	1956
Unspecified Disused Quarry	25 m	north	1891-1948
Shaw Hall Bank Quarry	29 m	north	1891-1982
Unspecified Wharf	29 m	south	1923-1938
Pond	30 m	south-east	1891-1904
Canal	59 m	south	1891-1938
Sewage Works	69 m	east	1938-1948
Pond	70 m	south	1854-1992
Sewage Works	98 m	south-east	1938-1948
Reservoir	103 m	south	1891-1938
Cuttings	104 m	west	1906-1918
Unspecified Pit	118 m	north-west	1933-1938
Sewage Works	120 m	south-east	1982-1992
Unspecified Pits	145 m	east	1938
Sewage Works	148 m	south	1906
Refuse Heap	152 m	south	1956
Cuttings	174 m	east	1904
Sewage Works	186 m	south-east	1938-1970
Unspecified Ground Workings	197 m	south-east	1904-1948
Unspecified Disused Quarry	204 m	north-west	1956-1977

Name	Distance from site boundary	Direction from site boundary	Date
Refuse Heaps	206 m	south-east	1956-1992
Unspecified Ground Workings	221 m	west	1891
Unspecified Quarry	237 m	north	1929-1967

The Mining Remediation Authority⁶ viewer indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²² records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 13-11, however no licence details have been provided by Groundsure.

Table 13-11 - Oaklands road site compound and greenfield site compound, including bridge works - Landfill and waste summary

Category	Site name or address	Description of waste	Distance from site	Direction from site
Historical landfill	Land at Shaw Hall Bank	-	21 m	south-east
Historical landfill	Land at Frenches Dye Works	-	35 m	south-east
Waste exemptions	-	Disposal by incineration	0 m	on-site
Waste exemptions	-	Use of waste in construction	76 m	south-east
Waste exemptions	-	Use of waste in construction	81 m	south-east
Waste exemptions	-	Various wastes including: Manual treatment of waste Storage of waste in secure containers Sorting mixed waste Use of waste in construction	219 m	south-east

13.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

13.9 Sensitive land uses

The data from Groundsure²² indicates there are no sensitive land uses within 250 m of the site. The site is located within a SSSI impact zone. There are no SSSIs, Ramsar or areas of conservation within 250 m of the site.

13.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are two pollution incidents reported by Groundsure²² within 250 m of the site and a summary has been provided in Table 13-12.

Table 13-12 - Oaklands road site compound and greenfield site compound, including bridge works - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Oils and fuel	140 m	west	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	24/03/2001
General biodegradable materials and wastes	246 m	south-east	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	11/02/2003

Pollution prevention and controls

The data from Groundsure²² indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²² indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure²² indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²² indicates there are no recent industrial land use on-site. There are 25 recent industrial land uses within 250m of the site. A summary has been provided in Table 13-13.

Table 13-13 - Oaklands road site compound and greenfield site compound, including bridge works - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Greenfield Rail Station	Public Transport, Stations and Infrastructure	Railway Stations, Junctions and Halts	5 m	north-west
Electricity Substation	Infrastructure and Facilities	Electrical Features	15 m	south-west
Electricity Substation	Infrastructure and Facilities	Electrical Features	35 m	east
Marina	Water	Moorings and Unloading Facilities	55 m	south-east
Mann's Wharf Bridge	Water	Moorings and Unloading Facilities	57 m	south-east
Mast (Telecommunication)	Infrastructure and Facilities	Telecommunications Features	62 m	south-east
Marina View	Water	Moorings and Unloading Facilities	70 m	south-east
Tank	Industrial Features	Tanks (Generic)	83 m	north-west
Gas Valve Compound	Infrastructure and Facilities	Gas Features	100 m	north-east
Hidden Hearing	Consumer Products	Disability and Mobility Equipment	139 m	north-west
Electricity Substation	Infrastructure and Facilities	Electrical Features	142 m	south-east

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Pump House	Industrial Features	Water Pumping Stations	145 m	south-east
Generator Services	Repair and Servicing	Vehicle Repair, Testing and Servicing	152 m	east
Peniron Metalwork & Fabrication	Construction Services	Metalworkers Including Blacksmiths	163 m	south-east
Electricity Substation	Infrastructure and Facilities	Electrical Features	183 m	north-west
Electricity Substation	Infrastructure and Facilities	Electrical Features	184 m	south-east
Hartley Botanic	Industrial Products	Horticultural Equipment	194 m	south-east
Avanti	Transport, Storage and Delivery	Distribution and Haulage	200 m	south-east
The Standring Brothers	Industrial Products	Rubber, Silicones and Plastics	200 m	east
The Windmill Special Needs Co Ltd	Consumer Products	Baby, Nursery and Playground Equipment	201 m	south-east
Range Valley Engineering Ltd	Engineering Services	Industrial Engineers	212 m	south-east
Bryn Hilton Motor Engineering	Repair and Servicing	Vehicle Repair, Testing and Servicing	233 m	south-east
Sewage Works	Infrastructure and Facilities	Waste Storage, Processing and Disposal	240 m	south-east
Electricity Substation	Infrastructure and Facilities	Electrical Features	243 m	south-east
Works	Industrial Features	Unspecified Works Or Factories	244 m	south-east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²².

Contaminated land designations

According to Groundsure²², there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250m of the site.

13.11 Site area reconnaissance

A site area walkover was undertaken on 22 August 2024 by an AtkinsRéalis Environmental Consultant. The walkover was conducted before Order Scheme boundary finalisation. A summary of the observations made during the visit is provided as follows.

Table 13-14 – Oaklands road site compound and greenfield site compound, including bridge works - Site walkover record

Item	Description
Location	<p>The site comprises three main areas: Saddleworth Rangers car park, the area of site in the east around the existing Greenfield Station and the area of land to the west off Oaklands Road.</p> <p>Pedestrian access to Saddleworth Rangers car park can be gained via steps from Shaw Hall Bank Road. Vehicular access to the car park is via a track which runs off Shaw Hall Bank Road to the west of the sports pitch.</p>
Description of current use/ activities	<p>Saddleworth Rangers car park was not accessed during the walkover however photographs were taken of the area from Shaw Hall Bank Road.</p> <p>The eastern area of site is situated around the existing Greenfield Station. Part of the site is located off Shaw Hall Bank Road at the junction with Chew Valley Road and is accessed via double metal gates. Land adjacent north is situated at a higher level to site and Shaw Hall Bank Road to the south is situated at a lower level. At the time of the site walkover, several items were being stored on the site including plastic barriers, plastic pipes, bags of Postcrete/sand and plastic crates. A mound of branches and vegetation was situated in the western part of the site.</p> <p>Greenfield Station and the embankment to the north of the railway were not accessed during the site walkovers however photographs were taken from Shaw Hall Bank Road and Oldham Road. Greenfield Station is located adjacent to Shaw Hall Bank Road and a small car parking area is present between the station and the pavement.</p> <p>The majority of the site area to the west off Oaklands Road is vegetated except for an area in the west of the site which was being used as a storage area at the time of the site walkover. The storage area can be accessed via double metal gates off Oaklands Road. At the time of the site walkover, several items were stored on the site including bulk bags of gravel, plastic barriers, plastic blocks, plastic pipes, bags of post</p>

Item	Description
	<p>cement, a skip and several parts of machinery. Two stockpiles of soil/rubble were present at the time of the site walkover.</p> <p>The remainder of the area of site to the west off Oaklands Road is vegetated (rough vegetation, trees, areas with Himalayan balsam). The site is situated at a lower level to the public right of way (PRoW).</p>
Fuel/chemical storage	No evidence of fuel storage was observed.
Evidence of land contamination	A slight leakage of potential fuel/oil was identified in one location next to a hydraulic hose at the area of site to the west off Oaklands Road. No evidence of significant contamination was identified elsewhere.
Invasive Species	Himalayan balsam was identified in the area of site to the west off Oaklands Road.
Surface coverage	<p>The ground surface of the area of site to the west off Oaklands Road comprises compact gravel and the area is relatively level.</p> <p>The ground surface of the eastern area around the existing Greenfield Station (located off Shaw Hall Bank Road at the junction with Chew Valley Road) comprises tarmac with grass growing through cracks and some areas of stone setts exposed.</p>
Boundary Types	<p>The area of site to the west off Oaklands Road is bound by Oaklands Road to the north/west, the railway to the south and a PRoW to the east.</p> <p>A stone wall runs between the remainder of the area to the west off Oaklands Road and the eastern boundary of the site from Oaklands Road, through and underpass to Shaw Hall Bank Road.</p> <p>The area of site located off Shaw Hall Bank Road at the junction with Chew Valley Road slopes up to the south-west and is bound by a retaining wall to the north and to the south.</p>
Surface Water Features	No surface water features were visible.

13.12 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the

source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and potential future use surrounding the bridge works and compound use to support works. It is assumed the Shaw Hall Bank compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical developments on the site including:
 - Railway buildings and sidings; and
 - Unspecified wharf.
- Off-site:
 - Historical developments surrounding the site including:
 - Electricity substations;
 - Frenches Dye Works;
 - Unspecified mills;
 - Tanks;
 - Brick works;
 - Quarries;
 - Sewage works;
 - Garages;
 - Digestion and sludge tanks;
 - Refuse heaps; and
 - Unspecified ground workings.

- Current industrial land uses surrounding the site:
 - Greenfield railway station;
 - Electricity substations;
 - Gas compound;
 - Water pumping station; and
 - Sewage works.
- Historical landfills:
 - 21 m south-east;
 - 35 m south-east.
- Pollution incidents:
 - Oils and fuels [140 m west]; and
 - General biodegradable materials and wastes [246 m south-east].

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and

- Future users of the site.
- Off-site:
 - Resident and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Bedrock secondary A aquifer;
 - Superficial secondary (Undifferentiated) aquifer [on-site]; and
 - Superficial secondary A aquifer [4 m east].
 - Surface Water:
 - Huddersfield Narrow Canal west section;
 - Unnamed watercourses; and
 - River Tame (Source to Chew Brook).
- Property and Services:
 - On-site:
 - Compound related facilities; and
 - Overbridge.
 - Off-site:
 - Commercial businesses; and
 - Residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health

- Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
- ingestion of contaminated soils, soil-derived dust and groundwater;
- dermal contact with soil, soil-derived dust and groundwater; and
- inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the

construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 13-15 - Oaklands road site compound and Greenfield site compound, including bridge works - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Historical developments surrounding the site including: Railway buildings and sidings; Unspecified wharf.	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	On-site: <u>Human Health</u> – Construction workers Future users of the site. <u>Property –</u> Compound related facilities Overbridge	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site. During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. It is also unlikely that significant excavation will take place on-site as it will be used for temporary welfare/offices and storage. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses in the north/north-west area of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i>	Inhalation of vapours.	Off-site: <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, users of public open spaces.	Low	Medium	Moderate/low risk Made Ground and infilled ground are anticipated to be present on the site, which may also be a source of ground gas. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. However, welfare cabins are likely to have a void between the floor
<i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Property and Services –</u> Commercial businesses and residential properties.			

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Inhalation of asbestos fibres.		Low	Severe	<p>and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk. It is also assumed that after construction of the railway is completed, there will be no buildings on-site for the accumulation of gas.</p> <p>Moderate risk Former buildings on-site which may have been demolished increase the likelihood of asbestos being present. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk. Where the site's use will be as a construction compound it is likely to comprise hardstanding or gravel which will break the direct exposure pathway. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health. If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer Secondary A superficial aquifer	Low	Medium	<p>Moderate/low risk The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer and for the superficial aquifers If significant Made Ground is present, there is potential for leaching of contaminants into</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	drainage, foul sewer, proposed service pipes/trenches, piled foundations.	Secondary (Undifferentiated) superficial aquifer)			groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – River Tame Huddersfield Narrow Canal west section Unnamed watercourses	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to surface waters. Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the east, towards the River Tame. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Electricity substations; Frenches Dye Works; Unspecified mills;	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>Human Health</u> – On-site: <u>Human Health</u> – Construction workers <u>Property</u> – Compound related facilities Overbridge	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Tanks; Brick works; Quarries; Sewage works; Garages; Digestion and sludge tanks; Refuse heaps; and Unspecified ground workings. Current industrial land uses surrounding the site: Greenfield railway station; Electricity substations; Gas compound; Water pumping station; and Sewage works. Historical landfills: 21 m south-east; 35 m south-east. Pollution incidents: Oils and fuels [140 m west]; General biodegradable materials and wastes [246 m south-east].	Inhalation of airborne asbestos fibres.		Unlikely	Severe	It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted. Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.
	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	Moderate/low risk Historical landfills are located around the site which could be a potential source of ground gas. No coal seams are found around the site.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum</i> <i>hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases</i> <i>(methane, carbon</i> <i>dioxide, hydrogen</i> <i>sulphide or carbon</i> <i>monoxide)</i>					

13.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the origination-site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of materials is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include the remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If

risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

14. BASELINE FOR OLDHAM ROAD ACCESS

14.1 Site history

Table 14-1 provides a summary of the historical development at the Oldham Rd site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²².

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 14-1 – Oldham Road access - Historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Urban District Council Sewage Works	1929-1948	73 m	east
Unspecified Works	1904-1948	83 m	south-east
Unspecified Quarry	1929-1989	94 m	north-west
Tanks	1904-1958	96 m	south-east
Unspecified Pit	1904	114 m	north-west
Unspecified Quarry	1891-1956	200 m	north-west
Unspecified Mill	1891	215 m	north
Cuttings	1904	216 m	south-east
Frenches Dye Works	1929-1956	218 m	south
Unspecified Works	1891-1970	226 m	south
Unspecified Tank	1957	248 m	south

14.2 Published geology

A summary of the published geology relevant to the Oldham Road Access site is provided below. The data has been sourced from Groundsure²³ and British Geological Survey (BGS) GeoIndex³.

²² Groundsure 2024. Enviro + Geo Insight (GS-KNT-M3C-RMA-6W2)

Artificial geology

The 1:10,000 scale published geology indicate that there is no Made Ground on-site. Made Ground is recorded 101 m south, 122 m west, 168 m south-east and 211 m south.

Superficial deposits

The 1:10,000 scale published geology maps indicate that there are no superficial deposits recorded on-site. Alluvium is recorded 63 m east of the site and Devensian Till is recorded 184 m south-east.

Bedrock

The 1:10,000 scale published geology indicates that the site is underlain by Lower Kinderscout Grit. There are two other bedrock geology designations within 250 m of the site. A summary is provided in Table 14-2. Figure 14-2 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 14-2 - Oldham Road access - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional details
Lower Kinderscout Grit	0 m	on-site	Sandstone
	138 m	south	
Hebden Formation	63 m	south-east	Mudstone and siltstone
	138 m	south	

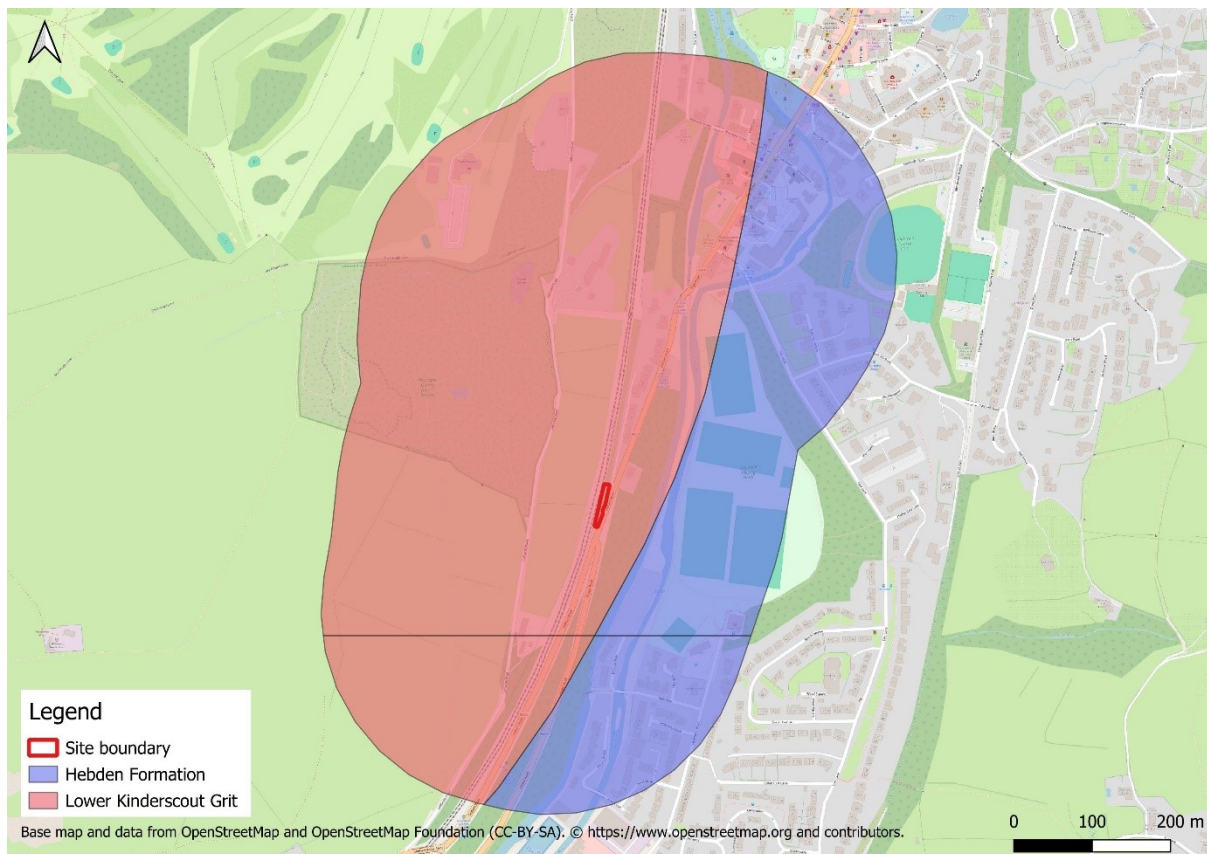


Figure 14-1 - Oldham Road access - Summary of bedrock and linear features

Faults and linear features

1:10,000 scale published geology indicates there are no bedrock faults or linear features on-site or within 250 m of the site.

14.3 Hydrogeology

Superficial aquifers

The data from Groundsure²³ indicates that a secondary A aquifer is located 45 m east of the site. The Environment Agency provides the following descriptions for the aquifer classification mentioned: “*Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*”

Bedrock aquifers

The data from Groundsure²³ indicates the presence of a secondary A bedrock aquifer underlying the site and surrounding 250 m.

Groundwater vulnerability

Groundsure²³ data indicates that the groundwater vulnerability is low for the superficial aquifer and medium for the bedrock aquifer. Low vulnerability is assigned to “*areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability*”. Medium vulnerability is assigned as an “*intermediate between high and low vulnerability*”.

Groundwater source protection zones

The data from Groundsure²³ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²³ indicates that there are no groundwater abstractions within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²³ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

14.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²³ as Huddersfield Narrow Canal west section and is located 63 m east of the site. A summary of all surface water courses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 14-3.

Table 14-3 - Oldham Road access - Surface watercourses

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Huddersfield Narrow Canal west section	Canal	63 m	east	Moderate
Tame (Source to Chew Brook)	River	84 m	east	Moderate
Unnamed watercourse	-	245 m	north-west	-

Surface water discharge consents

The data from Groundsure²³ indicates there are no licensed discharges to surface water features on-site. There are three licensed discharge to surface water features within 250 m of the site. A summary of all recorded surface water discharge consents within 250 m of the site has been provided in Table 14-4. There have been no recorded pollutant releases to surface water features on-site or within 250 m of the site.

Table 14-4 - Oldham Road access - Surface water discharge consents

Permit number	Address	Receiving water	Distance from site boundary	Direction from site boundary	Effective date
01OLD0141	Halls	River Tame	210 m	south	01/01/1995
016982796	Cottage PS, Greenfield, Greater Manchester	River Tame	210 m	south	30/09/1994
016992031	Balfour Beatty Development SWO, Near Moorgate Quarry, Greater Manchester	Wickens Clough	244 m	north-west	01/07/1991

Surface water abstractions

The data from Groundsure²³ indicates there are no surface water abstractions within 250 m of the site.

14.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²³ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

14.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²³ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 14-5.

Table 14-5 - Oldham Road access - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is not located within a coal mining area.
Non-Coal Mining Features	<p>There is one non-coal mining area on-site, for vein mineral.</p> <p>There is one other non-coal mining area within 250 m of the site, for vein mineral. This is located 138 m south.</p> <p>Underground mine workings are uncommon, although the geology is similar to that worked elsewhere.</p>
British Pits (active or closed surface and underground mineral workings)	<p>There are no recorded Brit pits on-site.</p> <p>There are two Brit pits recorded within 250 m of the site. These are 132 m north-west, 200 m north-west. All were utilised for the extraction of sandstone, however at date of entry, all have ceased to extract minerals.</p>
Surface Ground Workings	<p>There are no surface ground working features on-site.</p> <p>There are nine other surface ground workings features within 250 m of the site. Details are provided in Table 14-6.</p>
Underground Workings	There are no underground workings on-site or within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site. There is one other historical mineral planning area within 250 m of the site. This is located 197 m west and was established for surface mineral working in 1968.

Table 14-6 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 14-6 - Oldham Road access - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Canal	56 m	east	1891-1989
Sewage Works	78 m	east	1938-1948
Unspecified Quarry	94 m	north-west	1904-1967
Unspecified Quarry	134 m	west	1977-1989
Canal	137 m	south	1956-1992
Unspecified Quarry	200 m	north-west	1929-1956

Name	Distance from site boundary	Direction from site boundary	Date
Cuttings	216 m	south-east	1904
Unspecified Quarry	219 m	north	1891-1948
Pond	228 m	south	1891-1904

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²³ records no landfills or waste management facilities within 250 m of the site.

14.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

14.8 Sensitive land use

The data from Groundsure²³ indicates there are no sensitive land uses within 250 m of the site. The site is located within a SSSI impact zone. There are no SSSI's, Ramsar or areas of conservation within 250 m of the site.

14.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are no pollution incidents reported by Groundsure²³ within 250 m of the site.

Pollution prevention and controls

The data from Groundsure²³ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²³ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure²³ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²³ indicates there are no recent industrial land uses on-site. There is one recent industrial land use within 250 m of the site, a gas valve compound located 104 m south-east.

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site as indicated by Groundsure²³.

Contaminated land designations

According to Groundsure²³, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990, on-site or within 250 m of the site.

14.10 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

Historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of potential existing and/or future uses of the site as access for fencing installation.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - There are no potentially contaminative sources located on the site.
- Off-site:

- Historical developments surrounding the site including:
 - Sewage works;
 - Unspecified works;
 - Unspecified quarries;
 - Tanks;
 - Frenches dye works; and
 - Unspecified mills.
- Current features surrounding the site including:
 - Gas valve compound

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile and semi-volatile organic compounds (VOCs/SVOCs); and
- ground gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human health
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of public open space areas.

- Controlled waters
 - Groundwater:
 - Secondary A bedrock aquifer
 - Surface water
 - Huddersfield Narrow Canal west section;
 - River Tame; and
 - Unnamed watercourse.
- Property and services:
 - On-site:
 - Fencing.
 - Off-site:
 - Residential properties and commercial businesses.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground gases.
- Controlled waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;

- lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 14-7 - Oldham Road access - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>on-site</u> sources:</p> <p>No potential on-site sources.</p> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p> <p><i>Petroleum hydrocarbons</i></p> <p><i>Volatile organic compounds (VOCs)</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>On-site:</u></p> <p><u>Human Health</u> –</p> <p>Construction workers</p> <p>Future users of the site</p> <p><u>Property and Services</u> –</p> <p>Fencing</p> <p><u>Off-site:</u></p> <p><u>Human Health</u> –</p> <p>Resident and occupiers of commercial/ industrial premises, users of public open space areas.</p>	<p>Unlikely</p>	<p>Medium</p>	<p>Low Risk</p> <p>Based on the site history and recent land use, there is a low potential for contaminants to be present in soil and groundwater on-site. Future site users may come into contact with contaminants, if present, in areas of the site not covered with hardstanding vegetation.</p> <p>Construction workers using the site for access to the railway line may come into contact with soil and groundwater on-site and potential contaminants including during the construction of the underbridge. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
<p><i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p>	<p><u>Property and Services</u> –</p> <p>Commercial businesses</p>	<p>Unlikely</p>	<p>Medium</p>	<p>Low Risk</p> <p>Made Ground and infilled ground are not indicated as being present on the site, which may reduce the likelihood of ground gas.</p> <p>The installation of fencing will not introduce new enclosed spaces, however could introduce new migration pathways dependent on the depth of installation.</p>

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Inhalation of asbestos fibres.	and residential properties	Unlikely	Severe	<p>Moderate/low risk</p> <p>There are no previous buildings located on-site that could be a source of asbestos and Made Ground is not indicated to be present across the majority of the site, therefore no significant sources have been identified</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p>
	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration</p> <p>Lateral and vertical migration through Made Ground, superficial deposits and bedrock.</p> <p>Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.</p>	<p><u>Groundwater</u> <u>Controlled</u> <u>Waters</u></p> <p>Bedrock secondary A aquifer</p>	Unlikely	Medium	<p>Low Risk</p> <p>Based on the site history and recent land use, there is a low potential for contaminants to be present in soil and groundwater on-site .</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as low for the superficial aquifer and medium for the bedrock aquifer.</p> <p>If Made Ground is present, there is potential for leaching of contaminants into groundwater directly into the bedrock aquifer, due to no superficial deposits being present on-site. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p> <p>New migration pathways may be created as part of the fencing installation, increasing the potential risk to the groundwater.</p>

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Surface Water Controlled Waters</u> – Huddersfield Narrow Canal west section. River Tame Unnamed watercourses	Low	Medium	<p>Low Risk</p> <p>Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants, if present, will migrate to surface waters. However, based on the site history and recent land use, there is a low potential for contaminants to be present in soil and groundwater on-site .</p> <p>Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater.</p> <p>The hydraulic gradient is assumed to be towards the east, towards the River Tame, therefore the site is upgradient of the River.</p> <p>Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:</p> <p>Historical features surrounding the site including:</p> <p>Sewage works;</p> <p>Unspecified works;</p>	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<p><u>On-site:</u></p> <p><u>Human Health</u></p> <p>–</p> <p>Construction workers</p> <p>Future users of the site</p>	Unlikely	Medium	<p>Low Risk</p> <p>Based on the site history and recent land use, it is considered unlikely for contaminants in soil and groundwater from off-site source to migrate on-site due to the location, topography and distance to the off-site sources.</p> <p>It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the</p>

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Unspecified quarries; Tanks;					appropriate mitigation measures, which should minimise the potential risks.
Frenches dye works; and Unspecified mills Current features surrounding the site including: Gas Valve Compound	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. The surrounding area is most likely covered in vegetation or soil therefore there is a potential exposure to Made Ground whereby contaminants could migrate to the site through windblown dust.
<i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Unlikely	Medium	Low Risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Any superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.
	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Unlikely	Medium	Low Risk There are no historical landfills located within 250 m of the site. With the exception of the fencing no other permanently occupied buildings are planned for the development, so the risks from gas are deemed to be low. No coal seams are found around the site. There are no new service installations as part of the proposed development.

14.11 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the relevant Local Authority will be consulted to agree a remedial strategy and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

15. BASELINE FOR WICKENS UNDERBRIDGE MVL3/29 PROW UPGRADES

This section covers the relevant baseline data for the Moorgate Hall PRow Diversion and Access

15.1 Site history

Table 15-1 provides a summary of the historical development at the Wickens site and the surrounding 250 m buffer area. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²³.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 15-1 - Wickens underbridge MVL3/29 PRow upgrades - Historical development

Feature	Date	Distance from the site boundary	Direction from the site boundary
Railway line	1893-present	0 m	on-site
Victoria Mills	1891-1989	0 m	on-site
Wickens Quarry	1891-1977	3 m	west
Ladcastle Farm	1966-1993	3 m	north
Unspecified pit	1904	15 m	west
Top o' th' croft quarry	1958	31 m	west
Unspecified tank	1893-1958	72 m	north
Urban District Council Sewage Works	1904-1929	77 m	east
Railway building	1956	83 m	north
Unspecified tanks	1904-1958	100 m	east
Unspecified works	1904-1948	100 m	east
Alexandra Mill	1891-1989	110 m	north-east
Electricity substation	1966-1997	116 m	north-east
Railway sidings	1938	129 m	north
Moorgate Quarry	1904-1989	133 m	north-west

Feature	Date	Distance from the site boundary	Direction from the site boundary
Unspecified ground workings	1948-1967	145 m	east
Unspecified tank	1957	146 m	south-east
Cuttings	1891-1992	152 m	south
Unspecified tank	1952	172 m	south
Spring Mill	1891-1989	191 m	north-east
Mountain Ash Farm	1893-1906	201 m	north-west
Cuttings	1904	208 m	east
Unspecified pits	1938	224 m	south-east
Urban District Council Sewage works	1929-1938	246 m	south
Frenches Dye Works	1891-1970	249 m	south-east

15.2 Published geology

A summary of the published geology relevant to the Wickens Underbridge MVL3/29 PRoW upgrade site is provided below. The data has been sourced from Groundsure²³ and British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that the site is not recorded to be underlain by Made Ground. Made Ground is recorded 29 m west of the site.

Superficial deposits

The 1:10,000 scale published geology maps indicate that the majority of the site is not recorded to be underlain by superficial deposits. Alluvium is mapped at the north-east boundary of the site. Devensian Till is recorded 80 m to the south-east of the site.

Bedrock

The 1:10,000 scale published geology indicates that the site is underlain by the Lower Kinderscout Grit. There is one other bedrock geology designation within 250 m of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 12.2. Figure 15-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 15-2 - Wickens underbridge MVL3/29 PRow upgrades - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional Details
Lower Kinderscout Grit	0 m	on-site	Sandstone
Hebden Formation	37 m	east	Mudstone and siltstone

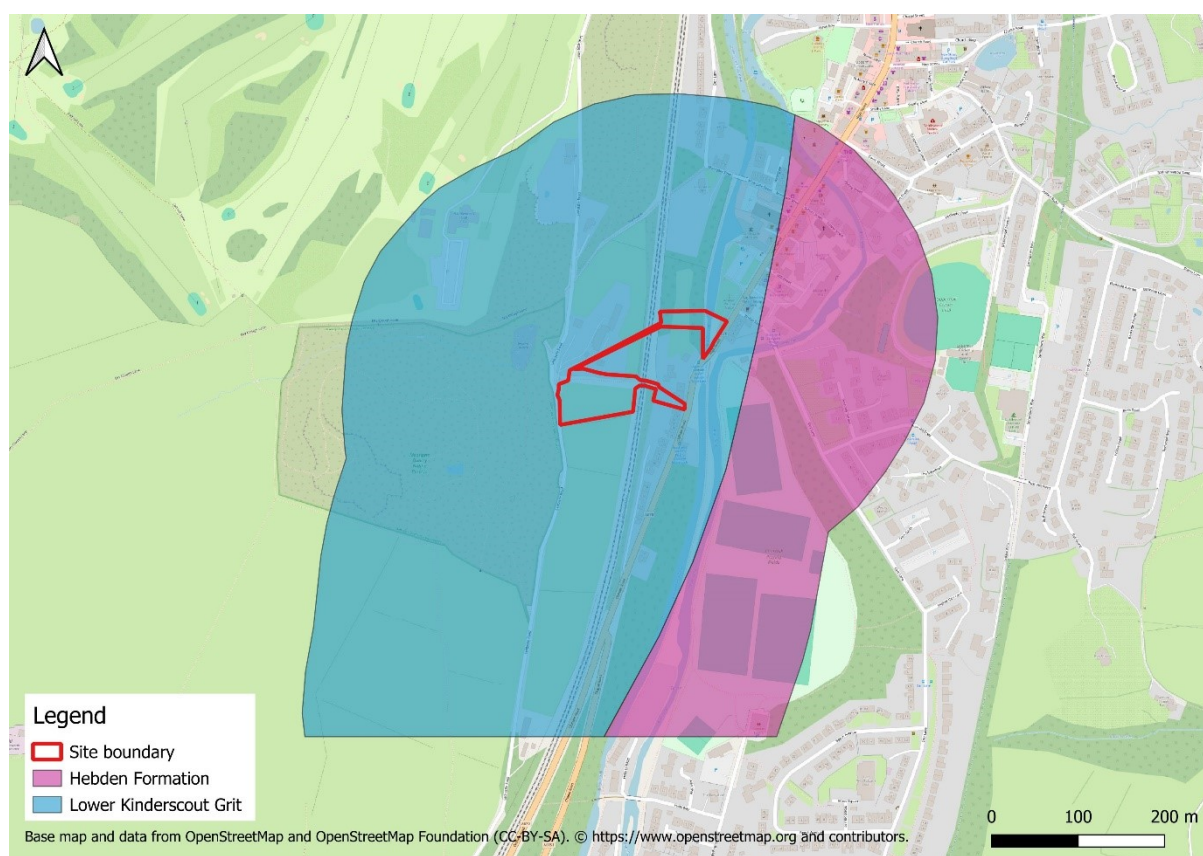


Figure 15-1 - Wickens underbridge MVL3/29 PRow upgrades - Summary of bedrock and linear features

Faults and linear features

1:10,000 scale published geology indicates there are no bedrock faults or linear features on-site or within 250 m of the site.

15.3 Hydrogeology

Superficial aquifers

The data from Groundsure²³ indicates that a secondary A superficial aquifer on-site, located in the north-east and extends off-site to the east. The Environment Agency provides the following descriptions for the aquifer classifications mentioned previously:

Secondary A aquifer: “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

Bedrock aquifers

The data from Groundsure²³ indicates the presence of a secondary A bedrock aquifer underlying the site and surrounding 250 m.

Groundwater vulnerability

Groundsure²³ data indicates that the groundwater vulnerability is low for the superficial aquifer, and medium for the bedrock aquifer. Low vulnerability is assigned to “areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability”. Medium vulnerability is assigned as an “intermediate between high and low vulnerability”.

Groundwater source protection zones

The data from Groundsure²³ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²³ indicates there are two groundwater abstraction licenses within 250 m of the site. These are located 228 m north-west (one active, one historical) of the site, extracting for spray irrigation operated by Saddleworth Golf Club.

Groundwater discharge consents

The data from Groundsure²³ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

15.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²³ as Huddersfield Narrow Canal west section and is located on-site. A summary of all surface watercourses (rivers, lakes, canals and coastal and transitional waters) within 250 m of the site has been provided in Table 15-3.

Table 15-3 - Wickens underbridge MVL3/29 PRow upgrades - Surface watercourses

Name of watercourse	Type	Flow Direction	Distance from site	Direction from site	WFD overall classification
Unnamed watercourse	Underground watercourse	-	0 m	on-site	-
Huddersfield Narrow Canal west section	Canal	-	0 m	on-site	Moderate
Tame (Source to Chew Brook)	River	south	22 m	south-east	Moderate
Unnamed watercourse	Underground watercourse	-	204 m	north	
White Brook	Underground watercourse	-	204 m	north	-

Surface water discharge consents

The data from Groundsure²³ indicates there are no licensed discharge to surface water features on-site. There are three licensed discharge to surface water features within 250 m of the site. A summary of all recorded surface water discharge consents within 250 m of the site has been provided in Table 15-4. There have been no recorded pollutant releases to surface water features on-site or within 250 m of the site.

Table 15-4 - Wickens underbridge MVL3/29 PRow upgrades - Surface water discharge consents

Permit Number	Address	Effluent Type	Receiving Water	Distance from Site	Direction from Site	Effective Date
016992031	Balfour Beatty Development SWO, Near Moorgate Quarry, Greater Manchester	Miscellaneous discharges – surface water	Wickens Clough	64 m	west	01/07/1991, revoked 01/07/1991

Surface water abstractions

The data from Groundsure²³ indicates there are no surface water abstractions within 250 m of the site.

15.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²³ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

15.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²³ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 15-5.

Table 15-5 - Wickens underbridge MVL3/29 PRow upgrades - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is not located within a coal mining area.
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral.

Category	Summary
	There is one other non-coal mining area within 250 m of the site, for vein mineral. This is located 22 m south. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere.
British Pits (active or closed surface and underground mineral workings)	There are no recorded Brit pits on-site. There are four Brit pits recorded within 250 m of the site. These are 58 m south, 58 m north-west, 124 m south-west and 180 m north-west. All were utilised for the extraction of sandstone, however at date of entry, all have ceased to extract minerals.
Surface Ground Workings	There is one surface ground working features on-site. There are 17 other surface ground workings features within 250 m of the site. Details are provided in Table 15-6.
Underground Workings	There are no underground workings on-site or within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site. There is one other historical mineral planning area within 250 m of the site. This is located 110 m west and was established for surface mineral working in 1968.

Table 15-6 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 15-6 - Wickens underbridge MVL3/29 PRow upgrades - Surface ground workings

Name	Distance from site	Direction from site	Date
Canal	0 m	on-site	1891-1977
Unspecified quarry	4 m	west	1904-1987
Unspecified pit	55 m	south-west	1904
Unspecified disused quarry	130 m	north-west	1929-1967
Pond	132 m	south-east	1891-1904
Unspecified ground workings	145 m	east	1956-1967
Cuttings	152 m	south	1970-1992
Unspecified disused quarry	153 m	north-east	1904-1989
Unspecified ground workings	164 m	north-east	1948
Cuttings	219m	south	1891-1948
Unspecified pits	223 m	south	1938
Cuttings	230 m	south	1929

Name	Distance from site	Direction from site	Date
Sewage works	249 m	South	1938-1948

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²³ records landfills/waste management facilities within 250 m of the site. A summary of all historical landfills has been provided in Table 15-7. However no licence details have been provided by Groundsure. There are no active landfills or licensed waste sites within 250 m of the site.

Table 15-7 - Wickens underbridge MVL3/29 PRow upgrades - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site	Licence issue date	Licence status
Historical landfill	School Street Reservoir	-	115 m	north-east	-	-
Waste exemptions	1, Bridge Street, Uppermill, Oldham, OL3 6HZ	Sorting and de-naturing of controlled drugs for disposal	38 m	north-east	-	-

15.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

15.8 Sensitive land uses

The data from Groundsure²³ indicates there are no sensitive land uses within 250 m of the site. The site is located within a SSSI impact zone. There are no SSSI's, Ramsar or areas of conservation within 250 m of the site.

15.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are three pollution incidents reported by Groundsure²³ within 250 m of the site and a summary has been provided in Table 15-8.

Table 15-8 - Wickens underbridge MVL3/29 PRow upgrades - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Oils and fuel - diesel	192 m	north-east	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	05-11-2002
Inorganic chemicals/products - other	203 m	north-east	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	04-05-2002
Sewage materials – crude sewage	213 m	north-east	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	03-04-2002

Pollution prevention and controls

The data from Groundsure²³ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²³ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure²³ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²³ indicates there are no recent industrial land uses on-site. There are seven industrial land uses within 250 m of the site. A summary has been provided in Table 15-9.

Table 15-9 - Wickens underbridge MVL3/29 PRow upgrades - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
Gas Valve Compound	Infrastructure and facilities	Gas features	107 m	east
Victoria Grant Ltd	Industrial products	Educational equipment and supplies	107 m	north-east
Electricity Substation	Infrastructure and facilities	Electrical features	142 m	north-east
Quarry (Disused)	Extractive industries	Unspecified quarries or mines	157 m	north-west
The Cake Kitchen	Foodstuffs	Baking and confectionery	172 m	north-east
Saddleworth St John Ambulance	Health support services	Ambulance and medical transportation services	176 m	north-east
Quarry (Disused)	Extractive industries	Unspecified quarries or mines	216 m	north-west

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²³.

Contaminated land designations

According to Groundsure²³, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990, on-site or within 250 m of the site.

15.10 Site area reconnaissance

A site walkover was undertaken on 24 October 2024 by two AtkinsRéalis environmental scientists. The walkover was undertaken prior to Order Scheme boundary finalisation. A summary of the observations made during the visit is provided as follows.

Table 15-10 – Wickens underbridge MVL3/29 PRoW upgrades - Site walkover record

Item	Description
Location	<p>The site is located on Third Party land in Uppermill, Greater Manchester. The site is off-track and comprises two land packages: the west package has a national grid reference of SD 99404 05244 and What3Words of roadmap.totally.comply. The east parcel has a national grid reference of SD 99512 05472 and What3Words of feared.prospered.define.</p> <p>At the time of the walkover, access had not been agreed. Therefore, the walkover of the west area was conducted from Ladcastle Road and the east section from the canal towpath/public footpath.</p> <p>The west land parcel covers an area of approx. 0.5 Ha, and the east parcel an area of approx. 0.2 Ha.</p>
Description of current use/activities	<p>The west parcel of land comprises a vegetated grazing field. Overhead power lines were observed running parallel to the west boundary.</p> <p>The east land parcel comprises a gravel canal towpath and the remainder of the site slopes upwards as a vegetated slope. In the east parcel, the area beyond the slope could not be observed from the towpath.</p>
Fuel/chemical storage	No evidence of fuel storage was observed in either land package. A brick building approx. 2.0 by 2.0 m with “gas” markings was observed in the east area, off the towpath.
Evidence of land contamination	No evidence of land contamination was observed. Possible Made Ground or reworked natural material was observed in the centre of the west land parcel; blocks/rubble could be observed forming part of a raised, vegetated mound.
Invasive Species	No evidence of invasive species was observed.
Surface coverage	<p>The west land parcel comprises entirely of vegetative cover (90% grass, 10% trees and shrubbery). Mature trees are sporadically present throughout the site. Three stone walls, in a state of disrepair, bisect the site in the north and centre of the parcel, running approximately east-west. The whole of the west land parcel slopes from approximately west to east from Ladcastle Road down to the railway.</p> <p>The east land parcel comprises a gravel towpath (approx. 10%) with a vegetated slope comprising of mature and young trees (approx. 40%). The area above the slope could not be observed.</p>
Boundary Types	The west land parcel has two access gates, both off Ladcastle Road. One is located in the south of the land parcel and the other in the approximate centre. Both gates comprised wood and are approx. 1.5 m tall. Livestock

Item	Description
	<p>wire metal fencing with wood posts comprises the majority of the western boundary of the site. The south of the west parcel of land is bound by a stone wall, approx. 1.5 m tall with a residential property beyond. The south-east boundary is also bound by a stone wall approx. 1.5 m tall with the railway beyond. The north-east boundary is bound by a metal fence approx. 1.0 to 1.5 m tall, often obscured by vegetation/shrubbery with the railway beyond. The north boundary comprises a livestock wire fence with wood posts. Mature trees are located beyond the fence.</p> <p>The east parcel of land is bound to the east by the Huddersfield Narrow Canal and to the west by the railway (not observed). The north and south of the east parcel are open (partially observed). A stone wall approx. 1.0 m tall with a livestock metal fence and wood posts (approx. 1.0 m tall) above the wall is located on the edge of the canal towpath and bisects the site in a north/south direction.</p>
Surface Water Features	No evidence of surface water was observed in the west land parcel. The Huddersfield Broad Canal runs north-south on the east land parcel.

15.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

Historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of potential existing and/or future uses of the site as a upgraded footpath for public right of way.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with former developments on-site:

- Railway line
 - Victoria Mills
- Off-site:
 - Historical features surrounding the site including:
 - Wickens Quarry;
 - Sewage Works;
 - Unspecified tanks;
 - Railway buildings;
 - Unspecified works, quarries and pits;
 - Frenches Dye works;
 - Spring Mill; and
 - Alexandra Mill.
- Current features surrounding the site including:
 - Gas Valve Compound;
 - Equipment; and
 - Transportation services.
- Historical landfills:
 - School Street Reservoir [108 m north-east].

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Resident and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Secondary A bedrock aquifer, Lower Kinderscout Grit; and
 - Secondary A superficial aquifer, Alluvium
 - Surface Water:
 - Huddersfield Narrow Canal west section [on-site];
 - River Tame [25 m south-west]; and
 - Unnamed watercourses
 - Property and Services:
 - On-site:
 - No on-site properties.
 - Off-site:
 - commercial businesses; and
 - residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks

to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 15-11 - Wickens underbridge MVL3/29 PRow upgrades - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Railway line Victoria Mills	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future users of the site	Unlikely	Medium	Low Risk Based on the site history and recent land use, there is a low potential for contaminants to be present in soil and groundwater on-site. Future site users may come into contact with contaminants, if present, in areas of the site not covered with hardstanding vegetation. Construction workers using the site for access to the railway line may come into contact with soil and groundwater on-site and potential contaminants including during the construction of the underbridge. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Property and Services</u> – Underbridge <u>Off-site:</u> <u>Human Health</u> – Resident and occupiers of commercial/ industrial premises, use of public open space areas.	Unlikely	Medium	Low Risk Made Ground and infilled ground are not indicated as being present on the site, which may reduce the likelihood of ground gas. Due the size of the underbridge, it is unlikely that any potential ground gas would accumulate in the space.
	Inhalation of asbestos fibres.	<u>Property and Services</u> – Commercial businesses and residential properties	Unlikely	Severe	Moderate/low risk There are no previous buildings located on-site that could be a source of asbestos and Made Ground is not indicated to be present across the majority of the

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					<p>site, therefore no significant sources have been identified</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater Controlled Waters</u> Bedrock secondary A Superficial secondary A aquifer Secondary (Undifferentiated) aquifer	Unlikely	Medium	<p>Low Risk</p> <p>Based on the site history and recent land use, there is a low potential for contaminants to be present in soil and groundwater on-site .</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as low for the superficial aquifer and medium for the bedrock aquifer.</p> <p>If Made Ground is present, there is potential for leaching of contaminants into groundwater directly into the bedrock aquifer, due to no superficial deposits being present on-site. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock.	<u>Surface Water Controlled Waters</u> – Huddersfield Narrow Canal west section. River Tame	Low	Medium	<p>Low Risk</p> <p>Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants, if present, will migrate to surface waters. However, based on the site history and recent land use, there is a low potential for contaminants to be present in soil and groundwater on-site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	Unnamed watercourses			Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the south-east, towards the River Tame, therefore the site is upgradient of the River. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Human Health</u> – Resident and occupiers of commercial/ industrial premises, use of public open space areas. <u>Property and Services</u> – Commercial businesses and residential properties.	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is nearby to residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future users of the site	Unlikely	Medium	Low Risk Based on the site history and recent land use, it is considered unlikely for contaminants in soil and groundwater from off-site source to migrate on-site due to the location, topography and distance to the off-site sources. It is considered unlikely that the public will have access to the area during construction providing the

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Historical features surrounding the site including: Wickens Quarry; Sewage Works; Unspecified tanks; Railway buildings; Unspecified works, quarries and pits; Frenches Dye works; Spring Mill; and Alexandra Mill. Current features surrounding the site including: Gas Valve Compound; Equipment; and Transportation services. Historical landfills: School Street Reservoir [115 m north-east].	Inhalation of airborne asbestos fibres.	Property and Services – Footpath upgrades	Unlikely	Severe	appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: Asbestos Metals PAHs Petroleum hydrocarbons VOCs	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Unlikely	Medium	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. The surrounding area is most likely covered in vegetation or soil therefore there is a potential exposure to Made Ground whereby contaminants could migrate to the site through windblown dust.
	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Unlikely	Medium	Low Risk Most of the off-site sources are located down hydraulic gradient from the site, with the exception of Wickens Quarry making it unlikely that contamination from off-site source will migrate towards the site in the secondary A bedrock aquifer.
					Low Risk Historical landfills are located within 250 m of the site, which could be a potential source of ground gas. However, there are none located within 100 m, limiting the potential for migration. No occupied buildings are planned for the development, so the risks from gas are deemed to be low. No coal seams are found around the site. There are no new service installations as part of the proposed development.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
PCBs					
Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)					

15.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

16. BASELINE FOR UPPERMILL VIADUCT VEHICLE ACCESS

16.1 Site history

Table 16-1 provides a summary of the historical development at the Uppermill Viaduct site and the surrounding 250 m buffer area. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²³.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 16-1 - Uppermill viaduct vehicle access - Summary of historical development

Feature	Date	Distance from the site boundary	Direction from the site boundary
Railway line	1906-2003	0 m	on-site
Cuttings	1906-1993	0 m	on-site
Unspecified quarries	1890-1989	0 m	on-site
Unspecified disused quarries	1956-1989	3 m	south-west
Railway line	1904-present	7 m	east
Railway sidings	1904-1948	8m	south
Lime Kiln	1904	43 m	north
Sawmills	1904-1967	62 m	north
Sewage works	1904-1948	72 m	north-west
Electricity substation	1952-1997	116 m	north-east
Unspecified disused quarries	1956-1989	127 m	south-west
Sewage tanks	1904-1948	147 m	north-west
Telephone exchanges	1989	160 m	north
Unspecified mill	1904-1989	160 m	south-east
Refuse heap	1904-1967	166 m	west
Unspecified tanks	1948	168 m	north-west

²³ Groundsure 2024. Enviro + Geo Insight (GS-IWW-P65-MNV-7DC)

Feature	Date	Distance from the site boundary	Direction from the site boundary
Unspecified quarry	1890-1956	192 m	north
Railway station	1890-1967	228 m	north-east
Unspecified tank	1906-1952	243 m	north-east
Cuttings	1890	247 m	north
Railway sidings	1904-1956	247 m	north-east
Unspecified tanks	1933	249 m	north-east

16.2 Previous ground investigations

Description of the investigation

Intrusive ground investigations were undertaken by Structural Soils Ltd. between March and July 2018^{20, 24} around the existing bridge structures, MVL3/25, MVL3/26 and viaduct MVL3/31, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Five of the locations are within 250 m of the site and have been summarised in Table 16-2 and the investigation locations are displayed in Figure 16-1.

Table 16-2 - Uppermill viaduct vehicle access - Summary of investigation

Item	No. undertaken
Number of boreholes	Two
Number of trial pits	Three
PID* testing undertaken	None
Number of soil samples tested	None
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None
* photo-ionisation detector	

²⁴ Structural Soils Ltd. 2018 TransPennine Route Upgrade Factual Report on Ground Investigation (151667-TSA-05-MVL3-DM3-X-MF-700012)

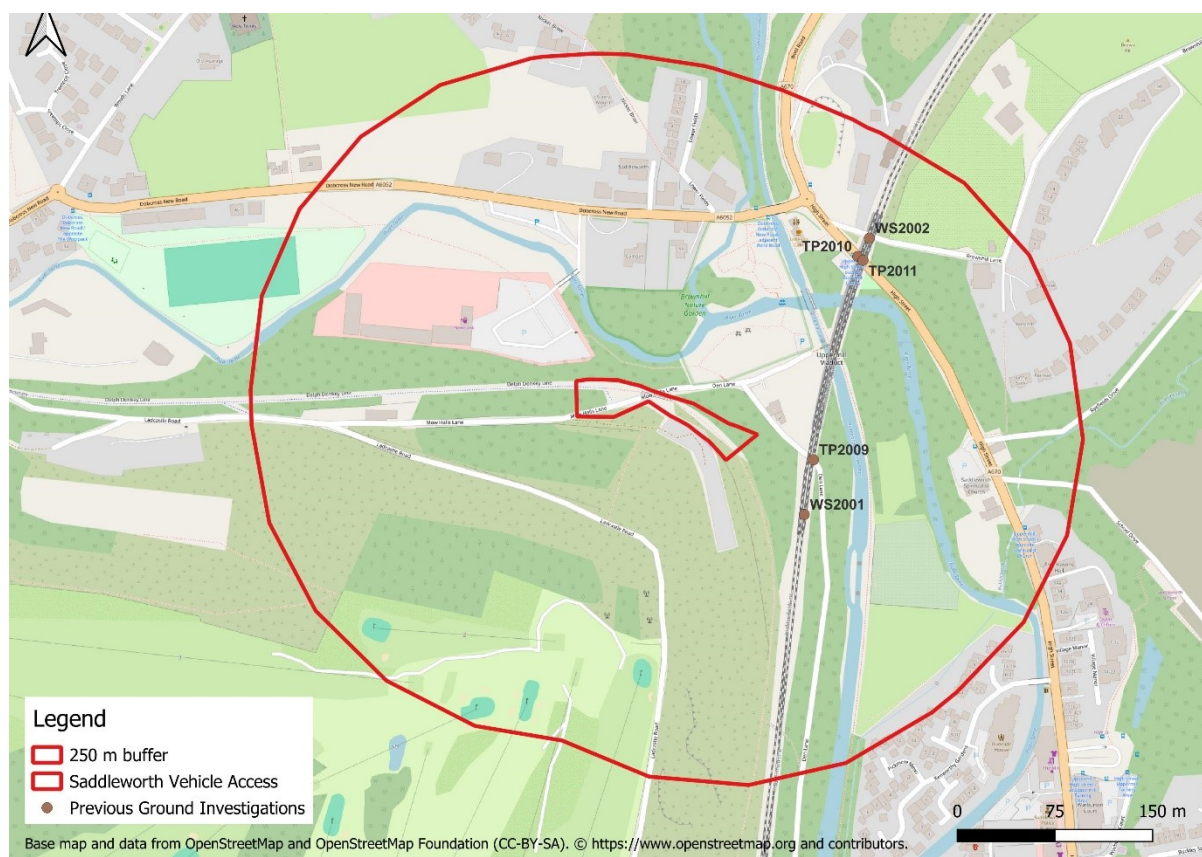


Figure 16-1 - Saddleworth viaduct vehicle access - Previous investigations

Ground conditions

Table 16-3 summarises the ground conditions encountered during the ground investigation.

Table 16-3 - Uppermill viaduct vehicle access - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Grey gravel of granite (Clean ballast).	0.18 – 0.40	0.40 - 1.38
	Dark greyish black gravelly sand. Gravel of ash, slag, clinker, granite, sandstone (Very dirty ballast)		
	Greyish black gravel of granite (Clean ballast).		

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
	Greyish black gravel ballast of granite (Clean ballast)		
	Dark grey orange slightly sandy gravel. Gravel is fine to coarse ballast (Slightly dirty ballast)		
	Black and dark grey very gravelly sand. Gravel is fine to coarse ballast (Very dirty ballast).		
	Dark grey very sandy gravel. Gravel is fine to coarse ballast (Slightly dirty ballast)		
	Dark grey and black very gravelly sand. Gravel is fine to coarse ballast (Very dirty ballast)		
Made Ground – Cohesive	Soft grey sandy gravelly clay. Gravel is of mixed lithologies including ash and clinker.	0.48	0.57

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic materials is displayed in Table 16-4.

Table 16-4 - Uppermill viaduct vehicle access - Summary of anthropogenic materials observed within the logs

Exploratory Hole	Depth (m)	Comment	Strata
TP2009	0.58 – 1.38	Ash, slag, clinker.	Made Ground
TP2010	0.49 – 0.68	Possible concrete bridge backing	
	0.57 – 0.58	Ash and clinker inclusions	

TP2011	0.58	Possible concrete bridge backing
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16.3 Published geology

A summary of the published geology relevant to the Uppermill Viaduct Vehicle Access site is provided below. The data has been sourced from Groundsure²⁴ and the British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate Made Ground is recorded underlying the majority of the site and is present within 250 m of the site. There is no Made Ground recorded in the south-west of the site. Made Ground may be associated with historical development including quarries, sewage tanks, electricity substations, railway buildings and sawmills.

Superficial deposits

The 1:10,000 scale published geology maps indicate there are no superficial geology designations mapped on-site. There are two superficial geology designations mapped within 250 m of the site. Alluvium is recorded 12 m north at its closest point and follows the path of the river to the south of the site, and Devensian Till is recorded 162 m east.

Bedrock

The 1:10,000 scale published geology that Lower Kinderscout Grit is recorded on-site. There are two other bedrock geology designations recorded within 250 m of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 16-5. Figure 16-2 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 16-5 - Uppermill viaduct vehicle access - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional details
Lower Kinderscout Grit	0 m	on-site	Sandstone
Hebden Formation	21 m	north	Mudstone and siltstone
	121 m	south	
	198 m	south-west	
Upper Kinderscout Grit	25 m	north	Sandstone
	143 m	south	



Figure 16-2 – Saddleworth viaduct vehicle access - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates that there is one bedrock fault located 4 m north of the site. This fault is visible in Figure 16-2.

16.4 Hydrogeology

Superficial aquifers

The data from Groundsure²⁴ indicates that there is a secondary A superficial aquifer along the northern boundary of the site. The Environment Agency provides the following descriptions for the aquifer classifications:

Secondary A Aquifer: “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

Bedrock aquifers

The data from Groundsure²⁴ indicates that a secondary A bedrock aquifer underlies the site and surrounding area.

Groundwater vulnerability

Groundsure²⁴ data indicates that the groundwater vulnerability is low for the superficial aquifer and medium for the bedrock aquifer.

A low vulnerability is assigned to “areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.”

A medium vulnerability is assigned as an “intermediate between high and low vulnerability”.

Groundwater source protection zones

The data from Groundsure²⁴ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²⁴ indicates there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²⁴ indicates there are no licensed discharge to groundwater features on-site or within 250 m of the site.

16.5 **Hydrology**

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²⁴ as the River Tame and is located 22 m north of the site. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 16-6.

Table 16-6 - Uppermill viaduct vehicle access - Surface watercourses

Name of watercourse	Type	Flow Direction	Distance from site	Direction from site	WFD overall classification
Tame (Source to Chew Brook)	River	south	22 m	north	Moderate
Huddersfield Narrow Canal west section	Canal	-	66 m	east	Moderate

Surface water discharge consents

The data from Groundsure²⁴ indicates there are no licensed discharge to surface water features on-site. There is one licensed discharge to surface water features within 250 m of the site; a summary of the surface water discharge consent details has been provided in Table 16-7. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 16-7 - Uppermill viaduct vehicle access - Surface water discharge consents

Permit number	Address	Effluent Type	Receiving water	Distance from site	Direction from site	Effective date
EPRNB3693WE	The Limekiln Cafe Stp, Wool Road, Dobcross, Oldham, OL3 5PB	Sewage discharges – final/treated effluent – not water company	River Tame	117 m	north-east	03/10/2019

Surface water abstractions

The data from Groundsure²⁴ indicates there are no surface water abstractions within 250 m of the site.

16.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²⁴ indicates that the maximum radon potential is 0-1%. The UK Radon Map⁵ indicates this results in a 0-1% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

16.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²⁴ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 16-8.

Table 16-8 - Uppermill viaduct vehicle access - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal mining areas	The site is not located within a coal mining area.
Non-coal mining features	There is one non-coal mining area on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site. There are three brit pits within 250 m of the site. All are surface ground working, for sandstone, however at date of entry have ceased to extract minerals. They are located 27 m south-west, 155 m south, and 209 m north-east.
Surface ground workings	There is one surface ground workings features on-site. There are 10 other surface ground workings features within 250 m of the site. Details are provided in Table 16-9.
Underground workings	There are no underground workings on-site or within 250 m of the site.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 16-9 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 16-9 - Uppermill viaduct vehicle access - Surface ground workings

Name	Distance from site	Direction from site	Date
Unspecified quarries	0 m	on-site	1904-1967
Unspecified disused quarries	3 m	south-west	1890-1989
Canal	62 m	east	1890-1989
Sewage works	72 m	north-west	1904-1948
Sewage tanks	94 m	north-west	1933
Unspecified quarry	152 m	north	1890-1956
Refuse heap	166 m	west	1904-1967
Unspecified quarries	192 m	south	1933-1967
Ponds	234 m	east	1890-1904
Cuttings	247 m	north	1890

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²⁴ records no landfills/waste management facilities within 250 m of the site.

16.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

16.9 Sensitive land uses

The data from Groundsure²⁴ indicates there is a Site of Special Scientific Interest (SSSI) located on-site. The SSSI is associated with Ladcastle and Den Quarries and extends off-site to the south-west. There are no Ramsar or areas of conservation on-site or within 250 m of the site. The site is located within a SSSI impact zone.

16.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are no pollution incidents reported by Groundsure²⁴ on-site or within 250 m of the site.

Pollution prevention and controls

The data from Groundsure²⁴ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²⁴ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure²⁴ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²⁴ indicates there are no recent industrial land uses on-site. There are seven industrial land uses within 250 m of the site. A summary has been provided in Table 16-10.

Table 16-10 - Uppermill viaduct vehicle access - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
Lime Kiln	Industrial features	Lime Kilns	90 m	north
Pump House	Industrial features	Water pumping stations	137 m	north-east
Masts (Telecommunication)	Infrastructure and facilities	Telecommunications features	141 m	south
Electricity Substation	Infrastructure and facilities	Electrical features	144 m	north-east
Disused Ladcastle quarries	Industrial features	Unspecified quarries or mines	149 m	south
Telephone Exchange	Infrastructure and facilities	Telecommunications features	159 m	north
Gas Governor Station	Infrastructure and facilities	Gas features	179 m	north

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²⁴.

Contaminated land designations

According to Groundsure²⁴, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

16.11 Site area reconnaissance

A site walkover was undertaken on 29 October 2024 by two AtkinsRéalis environmental scientists. A summary of the observations made during the visit is provided as follows.

Table 16-11 – Uppermill viaduct vehicle access - Site walkover record

Item	Description
Location	<p>The site is located on third party (not Network Rail) land in Uppermill, Greater Manchester. The site is located off-track with national grid reference SD 99507 06167 and What3Words of spoils.redouble.amuse.</p> <p>The site is accessed from the north via a public footpath, which crosses a bridge over Mow Halls Lane. At the time of the walkover, permissions had not been granted for land access. Photos were therefore taken from the public footpath and Mow Halls Lane. The site covers an area of approximately 0.26 Ha.</p>
Description of current use/ activities	A public footpath runs approximately north-south through the site. The site is otherwise vacant vegetated land. A compound/construction-site containing spare materials is located adjacent to the site next to the railway in the south.
Fuel/chemical storage	No fuel storage was in evidence on the areas of the site that could be observed.
Evidence of land contamination	No evidence of land contamination was observed. Some vegetated mounds, possibly of reworked natural or Made Ground were observed in the north of the site east of the footpath, and in the south of the site.
Invasive Species	No invasive species were observed.
Surface coverage	The site comprises predominantly of vegetation cover (80% trees and shrubbery), with a dirt footpath and outcrops of sandstone.

Item	Description
	The site is approx. level with the railway in the north section of site. The site then slopes slightly up to the south relative to the railway where it is approx. 1.5 to 2.0 m above the railway level.
Boundary Types	<p>The site is bound by a metal mesh fence approximately 1.5 m tall in the north-east of the site. Wood posts and metal wire lines form the boundary in the central east of the site and a stone wall bounds the site in the south-west of the site. A construction-site is located in the south-east of the site adjacent to the railway; heras panels prevent access to this area.</p> <p>The site is open to the south with a continuation of the public footpath and vacant vegetated land beyond. Outcrops of sandstone are located to the west, approx. 10.0 m tall with Ladcastle Road above. In the north-west of the site the outcrops are approximately 3.0 to 5.0 m above the footpath level with private residences and a kennels located above.</p> <p>The north of the site is open and accessible via a public footpath over Mow Halls Lane.</p>
Surface Water Features	No surface water was observed on-site.

16.12 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of the existing site use and future use as a vehicle access route to enable construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with former developments on-site:
 - Railway sidings;
 - Active railway.
 - Historical on-site uses including:
 - Unspecified quarries
- Off-site:
 - Historical features surrounding the site including:
 - Electricity substations;
 - Sewage works;
 - Unspecified quarries;
 - Sewage tanks;
 - Unspecified mills;
 - Railway station;
 - Refuse heaps; and
 - Railway sidings.
 - Current features surrounding the site including:
 - Lime Kiln;
 - Water pumping stations;
 - Electricity substations;
 - Ladcastle quarry;
 - Telecommunication features;
 - Gas governor station; and
 - Industrial features.

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), benzene, toluene, ethylbenzene, polychlorinated biphenyls (PCBs) and xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

Human Health:

- On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
- Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of public open space areas.

Controlled Waters:

- Groundwater:
 - Bedrock secondary A aquifer; and
 - Secondary A superficial aquifer
- Surface Water:
 - River Tame [27 m north-west]; and
 - Huddersfield Narrow Canal west section [39 m east].

Property and Services:

- Off-site: commercial businesses and residential properties.

Ecology:

- Ladcastle and Den Quarries SSSI

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

Human Health

- Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
- ingestion of contaminated soils, soil-derived dust and groundwater;
- dermal contact with soil, soil-derived dust and groundwater; and
- inhalation of organic vapours (e.g. from fuel spills) and ground gas.

Controlled Waters

- Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
- lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
- migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
- migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
- surface water run-off.

Property and Services:

- Ground gas migration and build up within confined spaces; and
- potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 16-12 - Uppermill viaduct vehicle access - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Made Ground associated with former developments on-site: Railway sidings Active railway Historical on-site uses including: Unspecified quarries	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future users of the site. <u>Property and services:</u> Access road <u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises Users of public open space areas.	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is some potential for contaminants to be present in soil and groundwater on-site. The proposed use of the site is for a vehicle access road and it is assumed only small scale excavation work will be required to construct the road. During operation of the road, site users will be transient through the site and are unlikely to be exposed to contaminants in soil or groundwater. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i>	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation). Inhalation of asbestos fibres.	<u>Property and Services</u> – Commercial businesses and residential properties.	Unlikely	Medium	Low Risk Made Ground is recorded on-site. However the degree of risk posed will be dependent on the type and the thickness of the Made Ground. The site does not require any confined or indoor spaces therefore accumulation of ground gas is unlikely. As the site is being used as vehicle access for the railway line, there is minimal time for any exposure to occur.
			Unlikely	Severe	Moderate/low risk As there are no previous buildings on-site it is unlikely that asbestos will be present.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)					<p>The proposed use of the site is for a vehicle access road and it is assumed only small scale excavation work will be required to construct the road. During operation of the road, site users will be transient through the site and are unlikely to be exposed to contaminants in soil including asbestos.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer Superficial secondary A aquifer	Low	Medium	<p>Moderate/low risk</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as medium for the bedrock aquifer and low for the superficial aquifer. Made Ground on-site results in a potential for leaching of contaminants into groundwater in the bedrock aquifer. The potential for mobilisation of contaminants from Made Ground in leachate will increase during excavation works but as only small scale excavations are assumed to be required, it is considered unlikely these will lead to significant mobilisation. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p> <p>There are no superficial deposits underlying the site, therefore Made Ground directly overlays bedrock. It is likely that contaminants would be able to leach directly down into the aquifer. The proposed</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					development does not include the use of piled foundations, and any necessary excavations are unlikely to be deep enough to create new preferential pathways.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water Controlled Waters</u> – River Tame Huddersfield Narrow Canal west section	Low	Medium	Moderate/low risk Given the distance between the site and the River Tame, it is possible that contaminants originating on-site could reach the river. The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the north-east, towards the River Tame. The main source that could produce contaminants that travel to site by hydraulic gradient is therefore the disused quarry to the west of the site. The majority of other sources are on the other side of the River Tame. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical features surrounding the site including: Electricity substations; Sewage works; Unspecified quarries;	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site: Human Health</u> – Construction workers Future users of the area <u>Property and services:</u> Access road	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is possible for future site users to come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Low	Medium	Moderate/low risk Asbestos may have been present in former off-site structures/buildings that have now been demolished.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Sewage tanks; Unspecified mills; Railway station; Refuse heaps; and Railway sidings. Current features surrounding the site including: Lime Kilns; Water pumping stations; Ladcastle quarries; Electricity substations; Telecommunication features; Gas governor station; and Industrial features. Pollution incidents</p> <p>Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen</i></p>	<p>Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).</p>		<p>Low</p> <p>Unlikely</p>	<p>Medium</p> <p>Medium</p>	<p>Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.</p> <p>Moderate/Low Risk There is the potential for off-site contamination to migrate towards the site and impact the secondary A bedrock aquifer given the distance of the potentially contaminative off-site land uses. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.</p> <p>Low Risk There are no landfills within 250 m of the site. No coal seams are found around the site. There are no new service installations as part of the proposed development. As the proposed development will be installing a construction access road, there will be minimal excavation required and no buildings will be installed, therefore the risk from gas is low.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<i>sulphide or carbon monoxide)</i>					

16.13 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

17. BASELINE FOR FORMER SADDLEWORTH STATION SITE COMPOUND

17.1 Site history

Table 17-1 provides a summary of the historical development at the former Saddleworth station site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²⁵.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 17-1 – Former Saddleworth Station site compound - Historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Brownhill Quarry	1890-1956	0 m	on-site
Cuttings	1890	20 m	north-east
Unspecified Tank	1993	27 m	north
Railway Sidings	1904-1967	32 m	east
Railway Station	1890-1967	33 m	east
Unspecified Tank	1997	33 m	north
Electricity Substation	1952-1997	47 m	south-east
Unspecified Tank	1906-1952	67 m	east
Sawmills	1904-1956	88 m	south-west
Railway Building	1933	91 m	north-east
Brownhill Bridge Sawmills	1906-1967	93 m	south-west
Telephone Exchanges	1989	110 m	west
Cuttings	1890-1956	115 m	north-east
Unspecified Quarry	1956	119 m	west
Lime Kiln	1904	124 m	south

²⁵ Groundsure, 2025. Enviro + Geo Insight (GS-G8A-KAK-G8G-A7A)

Feature	Date	Distance from site boundary	Direction from site boundary
Stone Bottom Mills (Woolen)	1904-1989	130 m	north
Unspecified Tanks	1901-1948	131 m	north-west
Unspecified Depot	1890	152 m	north
Unspecified Disused Quarry	1904-1977	195 m	north-west
Unspecified Works	1977, 1989	199 m	north-east
Unspecified Quarries	1890-1989	213 m	south-west
Mill Pond	1906-1967	218 m	north
Railway Sidings	1904-1948	223 m	south
Sewage Works	1906-1948	242 m	west
Unspecified Disused Quarries	1956-1989	245 m	south-west
Victoria Works	1952-1993	248 m	north-east

17.2 Previous ground investigations

Description of the investigation

Intrusive ground investigations were undertaken by Structural Soils Ltd. between March and July 2018^{20, 25} around the existing bridge structures, MVL3/25, MVL3/26 and viaduct MVL3/31, as part of an investigation for the TransPennine Route Upgrade – West of Leeds. Five of the locations are within 250 m of the site and have been summarised in Table 17-2 and the investigation locations are displayed in Figure 17-1.

Table 17-2 - Former Saddleworth Station site compound - Summary of investigation

Item	No. undertaken
Number of boreholes	Two
Number of trial pits	Three
PID* testing undertaken	None
Number of soil samples tested	None
Number of samples tested for soil-leachate	None
Number of groundwater samples tested	None
Gas monitoring rounds	None

* photo-ionisation detector



Figure 17-1 - Former Saddleworth Station site compound - Previous investigations

Ground conditions

Table 17-3 summarises the ground conditions encountered during the ground investigation.

Table 17-3 - Former Saddleworth Station site compound - Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
Ballast	Grey gravel of granite (Clean ballast).	0.18 – 0.40	0.40 - 1.38
	Dark greyish black gravelly sand. Gravel of ash, slag, clinker, granite, sandstone (Very dirty ballast)		
	Greyish black gravel of granite (Clean ballast).		

Geological Unit	General description	Range of depths to top of Unit (m bgl)	Range of depths to base of Unit (m bgl)
	Greyish black gravel ballast of granite (Clean ballast)		
	Dark grey orange slightly sandy gravel. Gravel is fine to coarse ballast (Slightly dirty ballast)		
	Black and dark grey very gravelly sand. Gravel is fine to coarse ballast (Very dirty ballast).		
	Dark grey very sandy gravel. Gravel is fine to coarse ballast (Slightly dirty ballast)		
	Dark grey and black very gravelly sand. Gravel is fine to coarse ballast (Very dirty ballast)		
Made Ground – Cohesive	Soft grey sandy gravelly clay. Gravel is of mixed lithologies including ash and clinker.	0.48	0.57

No groundwater was encountered in any of the boreholes.

No visual/olfactory evidence of hydrocarbon/chemical contamination recorded in the borehole logs. However, a summary of the observed anthropogenic materials is displayed in Table 17-4.

Table 17-4 - Former Saddleworth Station site compound - Summary of anthropogenic materials observed within the logs

Exploratory Hole	Depth (m)	Comment	Strata
TP2009	0.58 – 1.38	Ash, slag, clinker.	Made Ground
TP2010	0.49 – 0.68	Possible concrete bridge backing	
	0.57 – 0.58	Ash and clinker inclusions	

Exploratory Hole	Depth (m)	Comment	Strata
TP2011	0.58	Possible concrete bridge backing	

17.3 Published geology

A summary of the published geology relevant to the Former Saddleworth Sation Site Compound is provided below. The data has been sourced from Groundsure²⁶ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not recorded on-site. Made Ground is recorded within 250 m of the site, the closest being 44 m west of the site.

Superficial deposits

The 1:10,000 scale published maps indicate that superficial deposits are not recorded on-site. Alluvium is recorded 20 m west of the site, Devensian Till is recorded 173 m north-east and Head deposits are recorded 228 m north.

Bedrock

The 1:10,000 scale published geology indicates there is one bedrock geology designation recorded underlying the site, Lower Kinderscout Grit. There are two additional bedrock geology designations within 250 m of the site. The Hebden Formation is mapped 40 m west of the site, and Upper Kinderscout Grit is mapped 70 m west. Bedrock geology is visible in Figure 17-2.

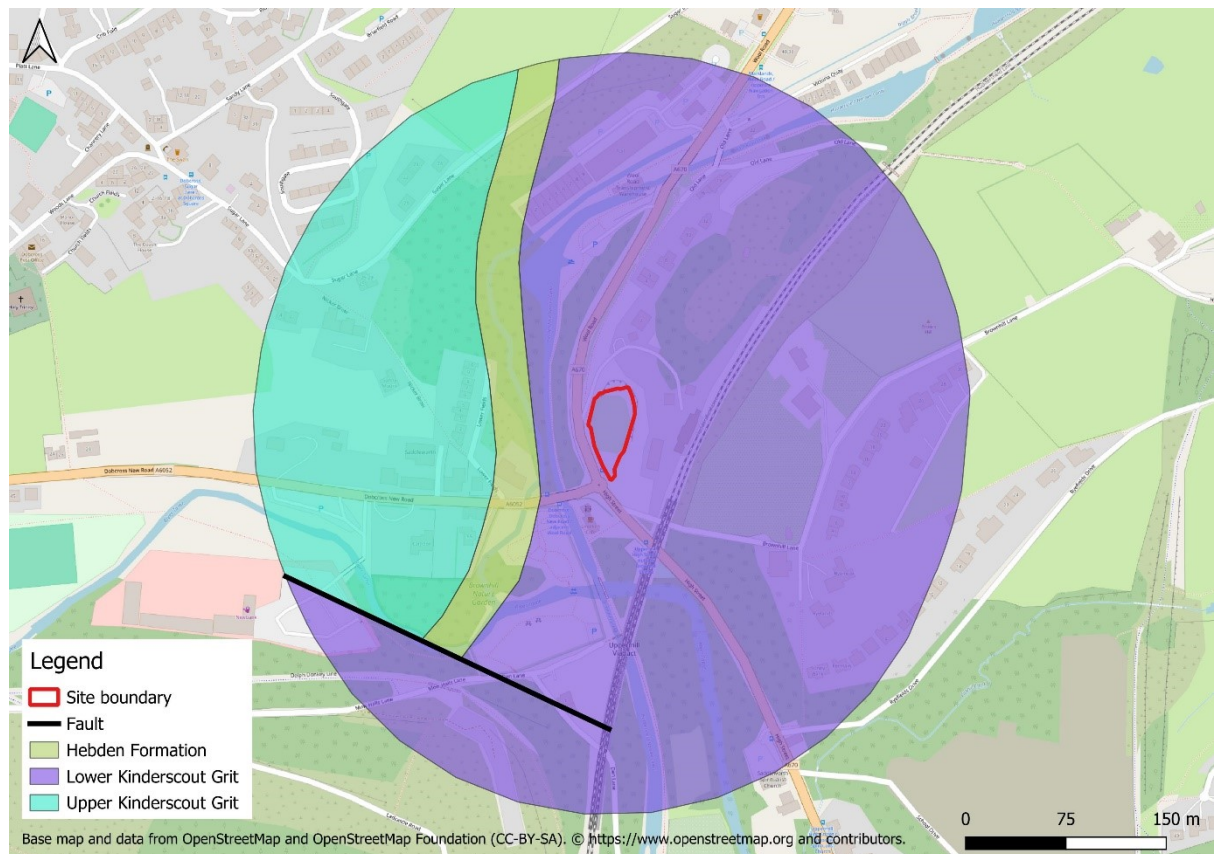


Figure 17-2 - Former Saddleworth Station site compound – Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is one bedrock fault within 250 m of the site. The fault is located 169 m south-west of the site.

17.4 Hydrogeology

Superficial aquifers

The data from Groundsure²⁶ indicates that there is secondary A superficial aquifer located 1 m south of the site. There is a secondary (Undifferentiated) superficial aquifer located 230 m north-east of the site.

A secondary A superficial aquifer is described by the Environment Agency as “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

A secondary (Undifferentiated) superficial aquifer is described as “when it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.”

Bedrock aquifers

The data from Groundsure²⁶ indicates the presence of a secondary A bedrock aquifer, associated with the Lower Kinderscout Grit, underlying the site and surrounding area.

Groundwater vulnerability

Groundsure²⁶ data indicates that the groundwater vulnerability is medium for the bedrock aquifer, and low for the superficial aquifer. This indicates that the bedrock aquifer is an intermediate between high and low vulnerability. A low vulnerability describes “areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability”.

Groundwater source protection zones

The data from Groundsure²⁶ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²⁶ indicates that there are no groundwater abstraction licenses on or within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²⁶ indicates there are no licenced discharges to groundwater features within 250 m of the site.

17.5 **Hydrology**

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²⁶ as the Huddersfield Narrow Canal west section and is located 17 m west of the site. A summary of all surface watercourses (rivers, lakes, canals, coastal and transitional waters) within 250 m of the site has been provided in Table 17-5.

Table 17-5 - Former Saddleworth Station site compound - Surface watercourses

Name of watercourse	Type	Distance from site boundary	Direction from site boundary	WFD overall classification
Huddersfield Narrow Canal west section	Canal	17 m	west	Moderate
Diggle brook	On ground surface watercourse	28 m	west	-
Tame (Source to Chew Brook)	River	79 m	south	Moderate

Surface water discharge consents

The data from Groundsure²⁶ indicates there are no licensed discharge to surface water features on-site. There is one licensed discharge to surface water features within 250 m of the site. A summary is provided in Table 17-6. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 17-6 - Former Saddleworth Station site compound - Surface water discharge consents

Permit number	Address	Receiving water	Distance from site boundary	Direction from site boundary	Effective date
EPRNB3693WE	The Lime Kiln Café Stp, Wool Road, Dobcross, Oldham, OL3 5PB	River Tame	75 m	south	03/10/2019

Surface water abstractions

The data from Groundsure²⁶ indicates there are no surface water abstractions on-site or within 250 m of the site.

17.6 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²⁶ indicates that the maximum radon potential on the site is between 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

17.7 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²⁶ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 17-7.

Table 17-7 - Former Saddleworth Station site compound - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is not located within a coal mining area.
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and underground mineral workings)	There is one brit pit on-site, for sandstone, but at date of entry has ceased operations. There is one other brit pit within 250 m of the site. This is located 243 m south, for sandstone, that has also ceased operations.
Surface Ground Workings	There is one surface ground workings feature on-site. There are 14 other surface ground workings features within 250 m of the site. Details are provided in Table 17-8.
Underground Workings	There are no underground workings on-site or within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 17-8 provides further detail on the surface ground workings and the relative distance and direction from the site boundary.

Table 17-8 - Former Saddleworth Station site compound - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Brownhill Quarry And Clay Pit	0 m	on-site	1890-1956
Canal	18 m	west	1890-1989
Cuttings	20 m	north-east	1890
Cuttings	115 m	north-east	1904-1948
Unspecified Quarry	119 m	west	1956
Cuttings	132 m	north-east	1890-1956
Pond	193 m	north-west	1904-1948
Unspecified Quarry	203 m	north-west	1904-1977
Unspecified Disused Quarries	208 m	south-west	1956-1967
Pond	209 m	north	1890-1904
Unspecified Quarries	213 m	south-west	1890-1989
Mill Pond	218 m	north	1956-1967
Unspecified Quarries	223 m	south	1904-1948
Sewage Works	242 m	west	1933-1948
Unspecified Quarry	245 m	west	1890-1904

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²⁶ records one historical landfill, located 210 m north of the site. However no additional information has been provided by Groundsure.

17.8 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

17.9 Sensitive land uses

The data from Groundsure²⁶ indicates that a site of special scientific interest (SSSI) is located 204 m south-west of the site. The SSSI is associated with the Ladcastle and Den Quarries. The site is also located within a SSSI

impact zone. There are no other sensitive land uses, including Ramsar or areas of conservation within 250 m of the site.

17.10 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There is one pollution incident reported by Groundsure²⁶ within 250 m of the site. A summary is provided in Table 17-9.

Table 17-9 - Former Saddleworth Station site compound - Pollution incidents

Type	Distance from site boundary	Direction from site boundary	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Atmospheric Pollutants and Effects	66 m	north-west	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	21/05/2001

Pollution prevention and controls

The data from Groundsure²⁶ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications on-site or within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²⁶ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure²⁶ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²⁶ indicates there are no recent industrial land uses on-site. There are seven recent industrial land uses within 250 m of the site. A summary has been provided in Table 17-10.

Table 17-10 - Former Saddleworth Station site compound - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Gas Governor Station	Infrastructure and Facilities	Gas Features	26 m	south-west
Electricity Substation	Infrastructure and Facilities	Electrical Features	57 m	south
Pump House	Industrial Features	Water Pumping Stations	57 m	south
Lime Kiln	Industrial Features	Lime Kilns	98 m	south
Telephone Exchange	Infrastructure and Facilities	Telecommunications Features	120 m	west
The Wharf	Water	Moorings and Unloading Facilities	200 m	north
Electricity Substation	Infrastructure and Facilities	Electrical Features	225 m	north

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site as indicated by Groundsure²⁶.

Contaminated land designations

According to Groundsure²⁶, there are no sites designated as contaminated land under Part 2A of the Environmental Protection Act 1990 on-site or within 250 m of the site.

17.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site use and potential future use of the site as a laydown area. It is assumed that the area will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical development on the site:
 - Brownhill Quarry and clay pit.
- Off-site:
 - Historical developments surrounding the site:
 - Tanks;
 - Railway station and sidings;
 - Electricity substations;
 - Sawmills;
 - Lime Kiln;
 - Stone Bottom woollen mills;
 - Unspecified works;
 - Mill pond;
 - Unspecified quarry;
 - Sewage works; and
 - Victoria works.
 - Current developments surrounding the site:
 - Gas governor station;
 - Electricity substation;
 - Water pumping station; and

- Lime Kiln.
- Historical landfill:
 - Unknown landfill [210 m north]
- Pollution incidents:
 - Atmospheric pollutants [66 m north-west].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), benzene, toluene, ethylbenzene, xylenes (BTEX), volatile and semi volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future users of the site.
 - Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Secondary A superficial aquifer;

- Secondary (Undifferentiated) superficial aquifer; and
- Secondary A bedrock aquifer.
- Surface water:
 - Huddersfield Narrow Canal west section;
 - Diggle Brook; and
 - River Tame.
- Property and Services:
 - On-site:
 - No on-site properties;
 - Off-site:
 - Commercial businesses; and
 - Residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - Ingestion of contaminated soils, soil-derived dust and groundwater;
 - Dermal contact with soil, soil-derived dust and groundwater; and
 - Inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters:
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;

- Lateral and vertical migration through permeable deposits in Made Ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - Migration of groundwater to the Huddersfield Narrow Canal west section and the River Tame;
 - Migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - Surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - Potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires the potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 17-11 - Former Saddleworth Station site compound - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Historical development surrounding the site: Brownhill Quarry and clay pit.	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future users of the site.	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is some potential for contaminants to be present in soil and groundwater on-site. The proposed use of the site is for a new laydown area and it is assumed no excavation work will be required to use the area. During operation, site users will be transient through the site and are unlikely to be exposed to contaminants in soil or groundwater. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>PCBs</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises Users of public open space areas.	Unlikely	Medium	Low Risk Made Ground is not recorded on-site, however is expected to be present as a result of the historical on-site quarry. However the degree of risk posed will be dependent on the type and the thickness of the Made Ground. The site does not require any confined or indoor spaces therefore accumulation of ground gas is unlikely. As the site is being used as an additional laydown area for the railway line, there is minimal time for any exposure to occur.
	Inhalation of asbestos fibres.	<u>Property and Services</u> – Commercial businesses and residential properties.	Unlikely	Severe	Moderate/low risk

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
NR14 - Environmental Report – Volume 3 Appendices
November 2025

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					<p>As there are no previous buildings on-site it is unlikely that asbestos will be present.</p> <p>The proposed use of the site is for a new laydown area and it is assumed no excavation work will be required to use the area. During operation, site users will be transient through the site and are unlikely to be exposed to contaminants in soil including asbestos.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer Superficial secondary A aquifer Superficial secondary Undifferentiated aquifer	Low	Medium	<p>Moderate/low risk</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as medium for the bedrock aquifer and low for the superficial aquifer. Potential Made Ground on-site could result in a potential for leaching of contaminants into groundwater in the bedrock aquifer. The site is predominantly covered by soft landscaping , therefore infiltration from precipitation will be possible which will in turn increase the mobilisation of leachate by rainwater.</p> <p>There are no superficial deposits underlying the site; therefore, Made Ground directly overlays bedrock. It is likely that contaminants would be able to leach directly down into the aquifer.</p>

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
NR14 - Environmental Report – Volume 3 Appendices
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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water</u> <u>Controlled Waters</u> – River Tame Huddersfield Narrow Canal west section Diggle Brook	Low	Medium	Moderate/low risk Given the distance between the site and the River Tame, it is possible that contaminants originating on-site could reach the river. The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. The hydraulic gradient is assumed to be towards the south-west, towards the River Tame. The site is predominantly covered by soft landscaping, therefore infiltration from precipitation will be possible which will in turn increase the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following off-site sources: Historical developments surrounding the site: Tanks; Railway station and sidings; Electricity substations; Sawmills; Lime Kiln; Unspecified quarry; Stone Bottom woollen mills;	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future users of the area <u>Property and services:</u> Access road	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is possible for future site users to come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings that have now been demolished. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Unspecified works; Mill pond; Sewage works; and Victoria works. Current developments surrounding the site:	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk There is the potential for off-site contamination to migrate towards the site and impact the secondary A bedrock aquifer given the distance of the potentially contaminative off-site land uses. Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.
Gas governor station; Electricity substation; Water pumping station; and Lime Kiln. Historical landfill: Unknown landfill [210 m north] Pollution incidents: Atmospheric pollutants [66 m north-west]. Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum</i> <i>hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases</i> <i>(methane, carbon</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Unlikely	Medium	Low Risk There is one historical landfill within 250 m of the site. However, given the distance from the site it is unlikely to pose a risk. No coal seams are found around the site. There are no new service installations as part of the proposed development. As the proposed development is a laydown area for construction materials, there will be no excavation required and no buildings will be installed, therefore the risk from gas is low.

The Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order
NR14 - Environmental Report – Volume 3 Appendices
November 2025

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
dioxide, hydrogen sulphide or carbon monoxide)					

17.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

BASELINE FOR DIGGLE RAIL HUB COMPOUND WORKS

18. BASELINE FOR DIGGLE RAIL HUB COMPOUND WORKS

18.1 Site history

Table 18-1 provides a summary of the historical development at the site and the surrounding area within 250 m of the site. The history of the site and surrounding area (within 250 m of the site) has been determined principally by reference to historical maps obtained from Groundsure²⁶.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 18-1 - Diggle Rail Hub Compound works - Summary of historical development

Feature	Date	Distance from the site boundary	Direction from the site boundary
Cuttings	1904	0 m	on-site
Railway building	1890-1951	0 m	on-site
Railway sidings	1890-1951	0 m	on-site
Refuse heap	1890	0 m	on-site
Unspecified tank	1951-1965	0 m	on-site
Railway line	1893-present	5 m	west
Railway sidings	1890-1951	12 m	north-west
Unspecified mills	1890-1980	15 m	north-west
Railway station	1890	18 m	north-east
Refuse heaps	1890-1904	18 m	north-west
Unspecified ground workings	1933-1951	28 m	north-west
Ceramic Works	1904-1951	33 m	east
Railway building	1890-1948	43 m	north-east
Diggle Mill	1890	56 m	east
Unspecified pit	1904-1948	56 m	north-west
Unspecified works	1933-1980	59 m	east

²⁶ Groundsure 2024, Enviro + Geo Insight (GS-TUD-B38-6YS-G9T)

Feature	Date	Distance from the site boundary	Direction from the site boundary
Railway building	1890	62 m	east
Unspecified ground workings	1951	64 m	south-east
Refuse heap	1890-1904	71 m	south-east
Refuse heap	1890-1951	88 m	north-west
Railway building	1890-1951	99 m	north-east
Electricity substation	1951	121 m	north-west
Warth Mills	1893-1988	121 m	west
Unspecified tank	1893-1965	134 m	north-west
Mill pond (infilled)	1890-1948	138 m	west
Mill ponds	1890-1951	159 m	east
Unspecified disused mill	1890-1948	161 m	north
Loom Works	1933-1980	175 m	south-west
Railway building	1890-1951	191 m	north-east
Tunnels	1890-1980	202 m	north-east
Unspecified tanks	1933-1988	209 m	south-west
Mill pond (present day: Marsh pond)	1933-1951	219 m	north
Unspecified mill	1890-1904	224 m	south-west

18.2 Published geology

A summary of the published geology relevant to the Diggle Rail Hub Compound Works site is provided below. The data has been sourced from Groundsure²⁸ and British Geological Society GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is recorded in the southern half of the site and also off-site within 250 m of the site. Made Ground may be associated with historical development including railway buildings, refuse heaps, unspecified tanks, unspecified mills, electricity substations and mill ponds, if infilled.

Superficial deposits

The 1:10,000 scale published geology maps indicate that Alluvium is recorded in the north of the site. The remainder of the site is not underlain by superficial deposits. Devensian Till is recorded 66 m west of the site.

Bedrock

The 1:10,000 scale published geology indicates there is Shale Grit recorded on-site. There is one other bedrock geology designation within 250 m of the site. A summary of the bedrock geology recorded on-site and within 250 m of the site boundary is provided in Table 18-2. Figure 19-1 presents bedrock formations up to 250 m from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 18-2 - Diggle Rail Hub Compound works - Bedrock geology summary

Description	Distance from the site boundary	Direction from the site boundary	Additional details
Shale Grit	0 m	on-site	Sandstone
Hebden Formation	152 m 221 m	west south-west	Mudstone and siltstone
Shale Grit	241 m 244 m	south east	Sandstone

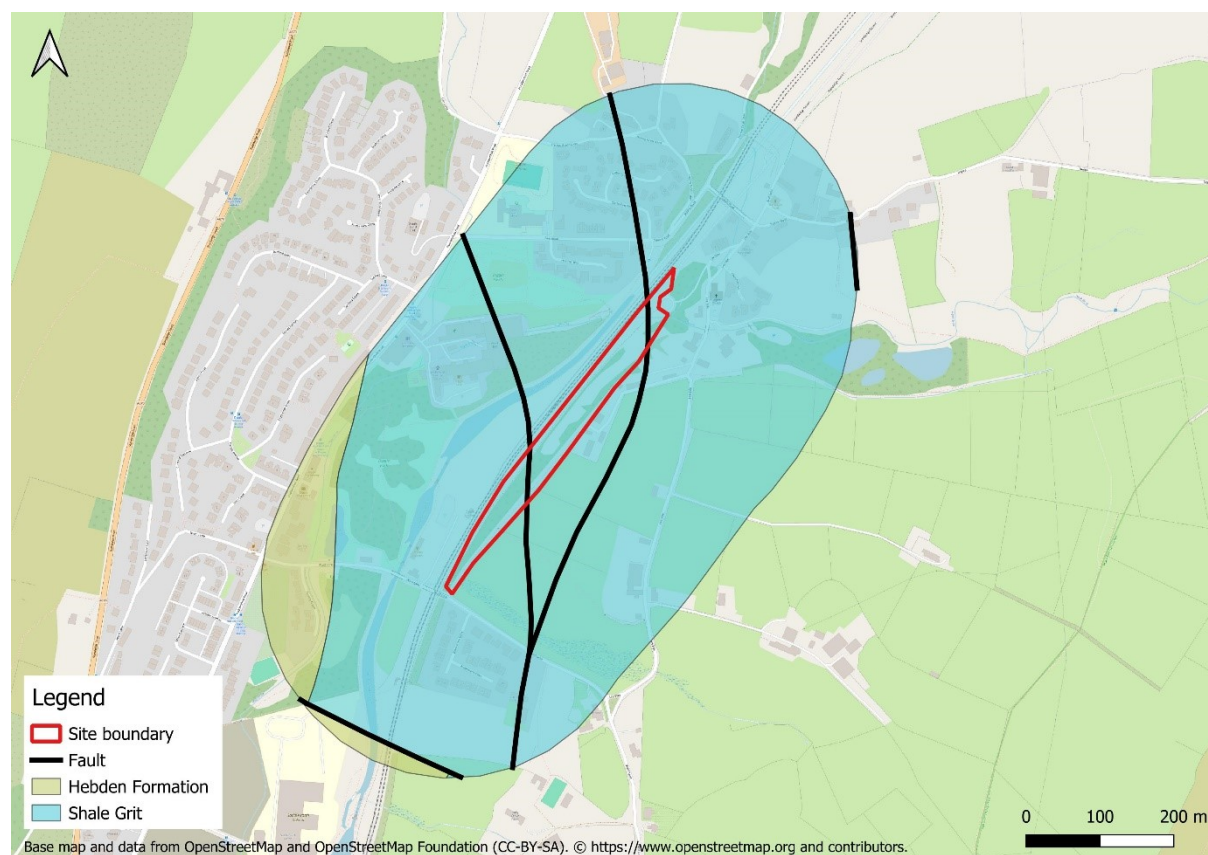


Figure 18-1 - Diggle Rail Hub Compound works - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are two bedrock faults on-site. There are two other bedrock faults within 250 m of the site. A summary is provided in Table 18-3 and faults are visible in Figure 19-1.

Table 18-3 - Diggle site compound works - Summary of bedrock faults

Category	Description	Orientation	Distance from the site boundary	Direction from the site boundary
Fault	Normal fault, inferred	north to south	0 m	on-site
Fault	Normal fault, inferred	north to south	0 m	on-site
Fault	Normal fault, inferred	north-west to south-east	221 m	south-west
Fault	Normal fault, inferred	north to south	245 m	north-east

18.3 Hydrogeology

Superficial aquifers

The data from Groundsure²⁸ indicates that there is one designated superficial aquifer on-site, a secondary A superficial aquifer in the north of the site. The majority of the site is not underlain by a superficial aquifer. There is a secondary (Undifferentiated) superficial aquifer 45 m south-west of the site.

Secondary A aquifers are defined by the Environment Agency as “permeable layers capable of supporting water supplies at a local rather than strategic scale; and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.”

Secondary (Undifferentiated) aquifers are defined as “where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designed as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.”

Bedrock aquifers

The data from Groundsure²⁸ indicates the presence of a secondary A bedrock aquifer underlying the site and surrounding area.

Groundwater vulnerability

Groundsure²⁸ data indicates that the groundwater vulnerability is high for the bedrock aquifer and the superficial aquifer. A high classification is assigned to areas which are “able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.”

Groundwater source protection zones

The data from Groundsure²⁸ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²⁸ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²⁸ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

18.4 **Hydrology**

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²⁸ as the River Tame, located on-site. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 18-4.

Table 18-4 - Diggle Rail Hub Compound works - Surface watercourses

Name of watercourse	Type	Flow Direction	Distance from site	Direction from site	WFD overall classification
Tame (Source to Chew Brook)	River	South	0 m	on-site	Moderate
Diggle Brook	Underground watercourse	West	0 m	on-site (north)	-
Unnamed watercourse	On ground surface watercourse	West	0 m	on-site (south)	-
Huddersfield Narrow Canal	Canal	-	16 m	north-west	Moderate

Name of watercourse	Type	Flow Direction	Distance from site	Direction from site	WFD overall classification
summit section					

Surface water discharge consents

The data from Groundsure²⁸ indicates there are no licensed discharge to surface water features on-site. There are three licensed discharges to surface water features within 250 m of the site. A summary of all surface water discharge consents within 250 m of the site has been provided in Table 18-5. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 18-5 - Diggle Rail Hub Compound works - Surface water discharge consents

Permit number	Address	Effluent Type	Receiving water	Distance from site	Direction from site	Effective date
016993370	Settlement Lagoon, Standedge Tunnel Portal, Huddersfield Narrow Canal, Diggle, Oldham	Trade discharges – unspecified	The Huddersfield Narrow Canal	94 m	north-west	08/03/2000
01OLD0015	Hanging Gate Diggle SSO, Oldham, Greater Manchester	Sewage discharges – sewer storm overflow – water company	Diggle Brook	201 m	west	09/02/1993

Surface water abstractions

The data from Groundsure²⁸ indicates there are no surface water abstractions within 250 m of the site.

18.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²⁸ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

18.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²⁸ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 18-6.

Table 18-6 - Diggle Rail Hub Compound works - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 scale maps and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal mining areas	There are no coal mining areas on-site.
Non-coal mining features	There is one non-coal mining area on-site. There is one other non-coal mining area within 250 m of the site. They are both for vein mineral. Underground mine workings are uncommon, although the geology is similar to that worked elsewhere. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
British pits (active or closed surface and underground mineral workings)	There are no brit pits on-site or within 250 m of the site.
Surface ground workings	There are three surface ground workings features on-site. There are 13 other surface ground workings features within 250 m of the site. Details are provided in Table 18-7.
Underground workings	There are no underground workings on-site. There is one underground working within 250 m of the site, located 202 m north-east. The underground working is associated with the construction of a railway tunnel and is shown on maps dating from 1890 to 1951.
Historical mineral planning areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 18-7 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 18-7 - Diggle Rail Hub Compound works - Surface ground workings

Name	Distance from site	Direction from site	Date
Cuttings	0 m	on-site	1904
Pond	0 m	on-site	1904
Refuse Heap	0 m	on-site	1890
Pond	7 m	east	1890-1980
Canal	14 m	north-west	1890-1951
Refuse Heap	25 m	north-west	1890-1951
Pond	27 m	north-west	1948
Unspecified Pit	56 m	north-west	1904-1948
Refuse Heap	75 m	south-east	1890-1951
Pond	78 m	north-west	1890-1948
Refuse Heap	88 m	north-west	1904-1951
Mill Pond	141 m	west	1890-1951
Mill Ponds	159 m	east	1951
Mill Ponds	211 m	east	1890-1980
Mill Pond	219 m	north	1890-1980

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high-risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²⁸ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 18-8. However, all licence details have not been provided by Groundsure.

Table 18-8 - Diggle Rail Hub Compound works - Landfill and waste summary

Category	Site name or Address	Description of waste	Distance from site	Direction from site
Historical landfill	Land At Warth Mills	-	65 m	north-west
Historical landfill	Land At Ward Lane	-	137 m	west

Category	Site name or Address	Description of waste	Distance from site	Direction from site
Historical landfill	Land Off Huddersfield Road	-	250 m	south-west
Waste Exemptions	Npa - Lee Side Diggle Oldham OL3 5jy	Deposit of waste from dredging of inland waters	108 m	north-east
Waste Exemptions	-	Use of waste in construction	132 m	south-east
Waste Exemptions	-	Use of mulch	215 m	north-east
Waste Exemptions	-	Use of waste in construction	215 m	north-east
Waste Exemptions	Sunfield Stables Diglea Oldham OL3 5LA	Use of waste for a specified purpose	223 m	east
		Deposit of waste from dredging of inland waters		
		Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising		
		Burning of waste as a fuel in a small appliance		
		Burning waste in the open		
		Spreading waste on agricultural land to confer benefit		
		Use of mulch		
		Treatment of kitchen waste in a wormery		
		Treatment of sheep dip for disposal		
		Treatment of waste in a biobed or biofilter		
		Use of waste in construction		
		Spreading of plant matter to confer benefit		
		Incorporation of ash into soil		
		Use of waste derived biodiesel as fuel		

Category	Site name or Address	Description of waste	Distance from site	Direction from site
		Pig and poultry ash		
		Spreading waste on agricultural land to confer benefit		

18.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

18.8 Sensitive land uses

The data from Groundsure²⁸ indicates there are no sensitive land uses, including sites of special scientific interest (SSSIs), Ramsar or areas of conservation within 250 m of the site. The site is located within a SSSI impact zone.

18.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There are eight pollution incidents reported by Groundsure²⁸ within 250 m of the site and a summary has been provided in Table 18-9.

Table 18-9 - Diggle Rail Hub Compound works - Pollution incidents

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Pollutant not identified	69 m	north-west	Category 4 (no impact)	Category 4 (no impact)	Category 3 (minor)	18-06-2001
Sewage materials – crude sewage	83 m	east	Category 4 (no impact)	Category 3 (minor)	Category 3 (minor)	28-07-2003
Sewage materials – sludge	128 m	south-east	Category 3 (minor)	Category 4 (no impact)	Category 3 (minor)	12-05-2001

Type	Distance from site	Direction from site	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
General biodegradable materials and wastes, construction and demolition materials and wastes, soils and clay,	168 m	north-west	Category 4 (no impact)	Category 3 (minor)	Category 4 (no impact)	12-04-2001
Oils and fuel	183 m	west	Category 4 (no impact)	Category 4 (no impact)	Category 2 (significant)	24-08-2001

Pollution prevention and controls

The data from Groundsure²⁸ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. A summary of the number and location of these applications has been provided in Table 18-10.

Table 18-10 - Diggle Rail Hub Compound works - Pollution controls overview

Pollution prevention and control category	Summary
Pollution inventory substances	There are no pollution inventory substances on-site or within 250 m of the site.
Licensed pollutant release (part 2A/B)	There are no licensed pollutant release part 2A and B features on-site. There is one licensed pollutant release part 2A and B features within 250 m of the site. Details are provided in Table 18-11.
Historical licensed industrial activities	There are no historical licensed industrial activities on-site or within 250 m of the site.
Licensed industrial activities (part A(1))	There are no licensed industrial activities on-site or within 250 m of the site.

Further detail of pollution prevention and controls on-site and within 250 m are given in Table 18-11.

Table 18-11 - Diggle Rail Hub Compound works - Pollution prevention and controls detailed summary

Type	Site	Description	Distance from site	Direction from site	Status
Licensed Pollutant Release (Part A(2)/B)	L Foster & Formack Ltd, Warth Mill, Huddersfield Rd, Oldham, OL3 5PJ	Timber Manufacture	200 m	north-west	Historical permit (Part B)

Planning hazardous substance consents

The data from Groundsure²⁸ indicates there are Control of Major Accident Hazards (COMAH) sites or planning hazardous substance consents within 250 m of the site. A summary has been provided in Table 18-12.

Table 18-12 - Diggle Rail Hub Compound works - Planning hazardous consents

Type	Site	Description	Distance from site	Direction from site	Status
List 2 dangerous substances	Amalgamated Construction Company Ltd, Po Box 1, Whaley Road	Copper, iron, lead, zinc	94 m	north-west	Not Active

Radioactive substances

The data from Groundsure²⁸ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²⁸ indicates there are two recent industrial land uses on-site, both related to telecommunication masts. There are 15 recent industrial land uses within 250 m of the site. A summary has been provided in Table 18-13.

Table 18-13 - Diggle Rail Hub Compound works - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site	Direction from site
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Mast (Telecommunication) (2no.)	Infrastructure and facilities	Telecommunications features	0 m	on-site
Idec Drilling Engineers Ltd	Construction services	Cutting, drilling and welding services	88 m	north-west
Alt Engineering	Engineering services	Industrial engineers	123 m	north-west
Diggle Motor Services Ltd	Repair and servicing	Vehicle repair, testing and servicing	123 m	north-west
L K Cars	Motoring	Second hand vehicles	123 m	north-west
S P S Substructure Protection Ltd	Engineering services	Civil engineers	123 m	north-west
Saddleworth Traditional Sash Windows	Industrial products	Glass	123 m	north-west
Shepley Yarns	Industrial products	Textiles, fabrics, silk and machinery	123 m	north-west
Woolyknit	Industrial products	Textiles, fabrics, silk and machinery	123 m	north-west
Dene Garage Greenfield Ltd	Repair and servicing	Vehicle repair, testing and servicing	130 m	north-west
Simply Signs Ltd	Industrial products	Signs	130 m	north-west
Business Park	Industrial features	Business parks and industrial estates	131 m	north-west
Electricity Substation	Infrastructure and facilities	Electrical features	201 m	north-west
Tank	Industrial features	Tanks (generic)	218 m	south- west
Factory	Industrial features	Unspecified works or factories	224 m	north-west
Gas Governor Station	Infrastructure and facilities	Gas features	239 m	west

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²⁸.

Contaminated land designations

According to Groundsure²⁸, there are no sites designated as contaminated land on-site under Part 2A of the Environmental Protection Act 1990. There are no sites designated as contaminated land within 250 m of the site.

18.10 Site area reconnaissance

A site walkover was undertaken on 28 October 2024 by two AtkinsRéalis environmental scientists. A summary of the observations made during the visit is provided as follows.

Table 18-14 – Diggle Rail Hub Compound works - Site walkover record

Item	Description
Location	<p>The site is located on third party (non-Network Rail) land in Diggle, Greater Manchester. The site is off-track with national grid reference SE 00583 07838 and What3Words of steam.incomes.alarm.</p> <p>At the time of the walkover, permissions had not been granted for land access. Photos were therefore taken from Lee Side Road (of the site entrance) and a public footpath above the site. The northernmost area of the site could not be observed.</p> <p>The compound covers an area of approximately 1.98 Ha. There is a dirt road running parallel to the railway, which bounds the site to the west. The road is located on a relatively flat area; a steep embankment is located east of the road, going up from the site. The north section changes elevation by approximately 6.0 m from the railway to the top of the embankment. Further south this embankment is not as steep and reduces to approximately 1.0 m. Ward Lane bounds the site to the south. A stone wall with a public footpath and fields bounds the site to the south-east, and private residences to the north-east.</p>
Description of current use/ activities	<p>The site comprises a dirt/gravel roadway running parallel to the railway. There was evidence of some materials storage between the roadway and the railway (an IBC, stacked bags of unidentified materials). Otherwise, the site was unused and vegetated.</p>
Fuel/chemical storage	<p>No fuel storage was in evidence on the areas of the site that could be observed. There was some evidence of materials storage next to the railway/roadway.</p>
Evidence of land contamination	<p>No evidence of land contamination was observed. Minor litter / fly tipping was observed in the south-east of the site of plastic bags and plastic sheeting and a wood sheet.</p>

Item	Description
Invasive Species	None observed.
Surface coverage	The site comprises a dirt/gravel roadway running parallel to the railway forming approx. 30% of the site and a vegetated embankment (shrubs, trees) forming approximately 70% of the site.
Boundary Types	<p>The site is accessed from the north via a double locked palisade gate approximately 2.0 m tall by 6.0 m wide, off Lee Side Road. A single-width road then enters the site. A wooden gate and fence approximately 2.0 m tall is located next to the entrance; a guard on the gate reported that this used to also be a site entrance but was now not in use.</p> <p>A palisade fence approx. 2.0 m tall bounds the site to the west, with the railway beyond. The embankment rises on the east of site, which is bounded by a stone wall approximately 1.0 m tall. The wall is in disrepair in many areas and livestock fencing has been placed over fallen areas. A Public Footpath is located adjacent to the east of the wall for much of the length of the site.</p> <p>The site is open to the south below the Ward Lane Bridge (access to the site is not possible from Ward Lane).</p>
Surface Water Features	<p>A stream was observed running approximately east-west on the field adjacent to the south east boundary, assumed to be a tributary of the River Tame. There was no evidence of the stream continuing onto the site, however a large drain/cover could be seen in the approximate location indicating that the stream may become culverted onto site.</p> <p>Diggle Brook flows beneath the north of the site; a bridge was observed from the site entrance which is likely to be over the brook.</p>

18.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeology and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site and future use of the site as a construction compound. It is assumed that the

compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Made Ground associated with former developments on-site:
 - Railway buildings; and
 - Railway sidings.
 - Historical on-site uses including:
 - Refuse heaps; and
 - Unspecified tanks.
- Off-site:
 - Historical features surrounding the site including:
 - Railway sidings;
 - Railway line;
 - Unspecified mills;
 - Diggle station;
 - Diggle Mill;
 - Refuse heaps;
 - Ceramic works;
 - Unspecified pit;
 - Unspecified works;
 - Unspecified tanks;
 - Mill ponds;

- Loom Works;
- Tunnels; and
- Electricity substations.
- Current features surrounding the site including:
 - Telecommunication features;
 - Construction services;
 - Industrial engineers;
 - Vehicle repairs;
 - Textiles and machinery;
 - Electrical substations;
 - Tanks;
 - Factory; and
 - Gas governor station.
- Historical landfills:
 - Land at Warth Mills [65 m north-west];
 - Land at Ward Lane [137 m west]; and
 - Land off Huddersfield Road [250 m south-west].
- Pollution incidents:
 - Unidentified pollutants [69 m north-west]; and
 - Sewage materials [83 m east].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated

biphenyls (PCBs), volatile and semi volatile organic compounds (VOCs/SVOCs); and

- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
 - Off-site:
 - Residents and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Bedrock secondary A aquifer; and
 - Superficial secondary A aquifer.
 - Surface Water:
 - River Tame [on-site]; and
 - Huddersfield Narrow Canal summit section [16 m north-west].
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health:
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters:
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction

Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 18-15 - Diggle Rail Hub Compound works - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following on-site sources:</p> <p>Made Ground associated with former developments on-site:</p> <p>Railway building; and</p> <p>Railway sidings</p> <p>Historical on-site uses including:</p> <p>Refuse heaps; and</p> <p>Unspecified tank</p> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p> <p><i>Petroleum hydrocarbons</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>On-site:</u></p> <p><u>Human Health</u></p> <p>–</p> <p>Construction workers</p> <p>Future site users.</p> <p><u>Property</u> –</p> <p>Compound related facilities</p> <p><u>Off-site:</u></p> <p><u>Human Health</u></p> <p>– Residents and occupiers of commercial/ industrial premises, use of public open spaces.</p> <p><u>Property and Services</u> –</p> <p>Commercial businesses</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site.</p> <p>During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. It is also unlikely that significant excavation will take place on-site as it will be used for temporary welfare/offices and storage.</p> <p>It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses in the north/north-west area of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The site is unlikely to be used after construction of the railway is complete and it is assumed that the site will be reinstated to its original condition.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and</p>		<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Made Ground is present on the site, which may be a source of ground gas.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
PCBs Volatile organic compounds (VOCs) Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)	accumulation (explosion). Inhalation of ground gas (asphyxiation).	and residential properties	Low	Severe	Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site. Welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.
	Inhalation of asbestos fibres.				Moderate risk Former buildings on-site increase the likelihood of asbestos being present from demolition of these structures. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk. The majority of the site, while in use as a compound, will be covered in hardstanding or gravel therefore it is unlikely that contact with the Made Ground or infilled ground will occur. Some of the site is already in use as a storage compound, underlain by gravel. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer	Low	Medium	Moderate/Low Risk The level of risk will be dependent on the potential for contaminants to migrate through the Made Ground and infilled ground on-site. Made Ground is recorded in the south of the site, resulting in Made Ground directly overlaying bedrock, as superficial deposits are only found in the

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	Superficial secondary A aquifer			<p>north of the site, increasing the potential migration of contaminants to bedrock over the majority of the site.</p> <p>As the site is being used as a storage compound, it is possible that new services (i.e. drainage) being installed for potential welfare cabins will create new preferential pathways.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as high for the bedrock aquifer and for the superficial aquifers</p> <p>If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
	<p>Leaching or dissolution of contaminants in unsaturated soils and subsequent migration</p> <p>Lateral and vertical migration through Made Ground, superficial deposits and bedrock</p> <p>Surface water run-off.</p> <p>Migration of contaminated water in drainage ditches to controlled surface waters.</p>	<p><u>Surface Water Controlled Waters</u> – River Tame</p> <p>Huddersfield Narrow Canal summit section</p>	Low	Medium	<p>Moderate/low risk</p> <p>Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to the surface waters located on-site.</p> <p>The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater.</p> <p>The hydraulic gradient is assumed to be towards the north, towards the River Tame, which also intersects with the site.</p> <p>Where hardstanding will be present in the proposed development, the infiltration from precipitation will be</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					<p>reduced which will in turn reduce the mobilisation of leachate by rainwater.</p> <p>As the site may include welfare cabins and therefore require services (i.e. drainage), there is potential for the works to create preferential pathways to the controlled waters.</p>
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:</p> <p>Historical features surrounding the site including:</p> <p>Railway sidings;</p> <p>Unspecified mills;</p> <p>Diggle station;</p> <p>Diggle Mill;</p> <p>Refuse heaps;</p> <p>Ceramic works;</p> <p>Unspecified pit;</p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil derived dust.</p>	<p><u>On-site:</u></p> <p><u>Human Health</u></p> <p>–</p> <p>Construction workers</p> <p><u>Property</u> –</p> <p>Compound related facilities</p>	<p>Unlikely</p>	<p>Medium</p>	<p>Low Risk</p> <p>Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site.</p> <p>It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation.</p> <p>The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised.</p> <p>It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.</p>
<p>Unspecified works;</p> <p>Unspecified tanks;</p> <p>Mill ponds;</p> <p>Loom Works;</p> <p>Tunnels; and</p>	<p>Inhalation of airborne asbestos fibres.</p>		<p>Unlikely</p>	<p>Severe</p>	<p>Moderate/low risk</p> <p>Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Electricity substations.					industrialised areas is covered in hardstanding and/or vegetation.
Current features surrounding the site including: Telecommunication features; Construction services; Industrial engineers; Vehicle repairs; Textiles and machinery; Electrical substations; Tanks; Factory; and Gas governor station.	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/Low Risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. As there are numerous sources of contamination close to the site, there is potential for contaminants to migrate to the site, via the hydraulic gradient. As the watercourses intersect the site, it is likely that any nearby contaminants would be able to reach the site. Superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.
Historical landfill: Land at Warth Mills [65 m north-west]; Land at Ward Lane [137 m west]; and Land off Huddersfield Road [250 m south-west]. Pollution incidents:	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	Moderate/Low Risk Historical landfills are located within 100 m of the site, which could be a potential source of ground gas. Due to the proximity of the historical landfill, migration to the site is possible. However, the landfill is underlain by cohesive superficial deposits and is also located on the other side of the Huddersfield Narrow Canal from the site, which will limit migration. No coal seams are located within 250 m of the site.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Unidentified pollutants [69 m north-west]; Sewage materials [83 m east]. <i>Possible contaminants include:</i> <i>Asbestos</i> <i>Metals</i> <i>PAHs</i> <i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>					

18.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If

risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge the relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

19. BASELINE FOR GRANDPA GREENE’S COMPOUNDS

19.1 Site history

Table 19-1 provides a summary of the historical development at the site and the surrounding area within 250 m of the site boundary which may represent potential sources of contamination. The history of the site and surrounding area (within 250 m of the site) has been determined principally by reference to historical maps obtained from Groundsure²⁸.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 19-1 – Grandpa Greene’s compounds - Historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Cuttings	1904	0 m	on-site
Railway Sidings	1890-1951	0 m	on-site
Refuse Heaps	1890-1904	0 m	on-site
Unspecified Mills	1890-1980	11 m	north-west
Refuse heap	1890-1904	11 m	north-west
Unspecified Ground Workings	1933-1951	19 m	north-west
Railway Sidings	1890-1951	20 m	south-east
Warth Mill	1951	20 m	north-west
Unspecified Pit	1933-1951	20 m	north-west
Unspecified Tank	1951-1965	21 m	south-east
Railway Building	1890	22 m	south-east
Unspecified Ground Workings	1933-1951	24 m	south-west
Railway Sidings	1890-1951	28 m	south
Refuse Heap	1890	34 m	south-east
Electricity Substation	1951	74 m	north-west
Unspecified Tank	1893	75 m	north-west
Railway Building	1948	94 m	south-west
Refuse Heap	1890-1904	101 m	north
Tanks	1904-1906	101 m	north
Railway Sidings	1890-1951	116 m	south-west
Mill Pond	1890-1948	124 m	west

Feature	Date	Distance from site boundary	Direction from site boundary
Mill Pond	1890-1948	125 m	west
Mill Pond	1890-1948	181 m	south-west
Unspecified Pit	1904-1948	183 m	north
Ceramics Works	1904-1951	200 m	east
Railway Sidings	1890-1951	206 m	north-east
Unspecified Works	1933-1980	223 m	east
Unspecified Mill	1890	224 m	east
Refuse Heap	1890-1951	230 m	east
Railway Building	1904-1951	236 m	north-east

19.2 Published geology

A summary of the published geology relevant to the Grandpa Greene's Compounds site is provided below. The data has been sourced from Groundsure²⁸ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not present on-site. Made Ground is recorded within 250 m of the site.

Superficial deposits

The 1:10,000 scale published geology maps indicated that there are no superficial deposits on-site. Till deposits are recorded 23 m north-west of the site, and Alluvium is recorded 55 m north-west.

Bedrock

The 1:10,000 scale published geology maps indicate there is one bedrock geology designated on-site. There is one other bedrock geology designation within 250 m of the site.

A summary of the bedrock geology encountered on-site and within 250 m of the site boundary is provided in Table 19-2. Figure 20-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 19-2 - Grandpa Greene's compounds - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional Details
Shale Grit	0 m	on-site	Sandstone
	122 m	south-east	
Hebden Formation	137 m	west	Mudstone And Siltstone

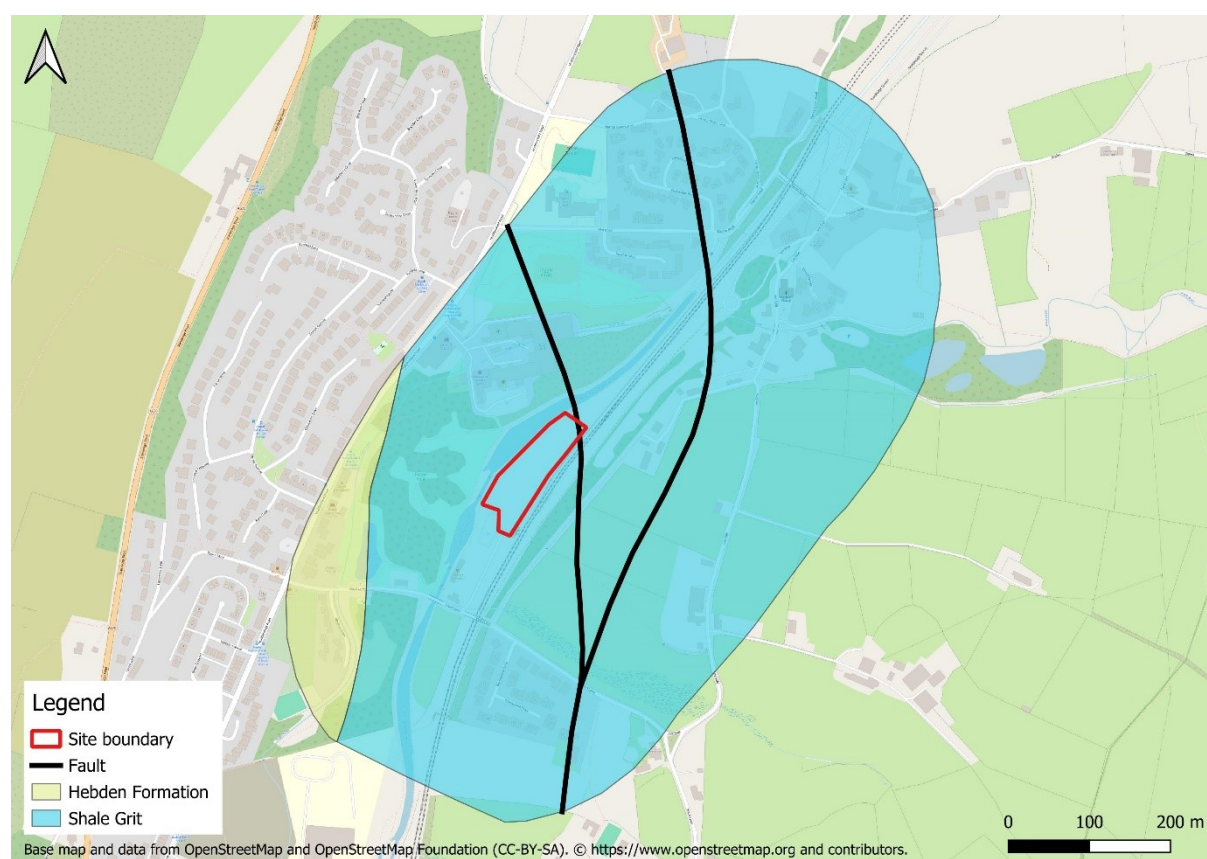


Figure 19-1 - Grandpa Greene's compounds - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is one bedrock fault on-site. There is one fault within 250 m of the site. Details are provided in Table 19-3 and faults are visible in Figure 20-1.

Table 19-3 - Grandpa Greene's compound - Bedrock fault summary

Description	Distance from site boundary	Direction from site boundary
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Normal fault, inferred; crossmarks on downthrow side	0 m	on-site
Normal fault, inferred; crossmarks on downthrow side	122 m	south-east

19.3 Hydrogeology

Superficial aquifers

The data from Groundsure²⁸ indicates that there are no designated superficial aquifers underlying the site. A secondary (Undifferentiated) superficial aquifer is located 12 m south-west, and a secondary A superficial aquifer is located 67 m north-west.

The Environment Agency describes a secondary (Undifferentiated) superficial aquifer as “Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor or non-aquifer in different locations due to the variable characteristics of the rock type”.

Secondary A aquifers are described as “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers”

Bedrock aquifers

The data from Groundsure²⁸ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure²⁸ data indicates that the groundwater vulnerability is high for the bedrock aquifer. A high classification is assigned to areas which are “able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits”.

Groundwater source protection zones

The data from Groundsure²⁸ and MAGIC website⁴ both indicate that the site is not 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²⁸ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²⁸ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

19.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²⁸ as the Huddersfield Narrow Canal summit section, located 5 m north-west. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 19-4.

Table 19-4 - Grandpa Greene's compounds - Surface watercourses

Name of Watercourse	Type	Distance from Site	Direction from Site	WFD Overall Classification
Huddersfield Narrow Canal summit section	Canal	5 m	north-west	Moderate
Tame (Source to Chew Brook)	River	87 m	north	Moderate
Diggle duck pond	Pond	141 m	south-west	

Surface water discharge consents

The data from Groundsure²⁸ indicates there are no licensed discharge to surface water features on-site. There are three licensed discharges to surface water features within 250 m of the site. A summary of all surface water discharge consents within 250 m of the site has been provided in Table 19-5. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Table 19-5 - Grandpa Greene's compounds - Surface water discharge consents

Permit Number	Address	Receiving Water	Distance from Site	Direction from Site	Effective Date
016993370	Settlement Lagoon, Standedge Tunnel Portal,	Huddersfield Narrow Canal	27 m	north-west	08/03/2000

	Huddersfield Narrow Canal, Diggle, Oldham				
016982527	Hanging Gate Diggle SSO, Oldham, Greater Manchester	Diggle Brook	211 m	south-west	09/02/1993

Surface water abstractions

The data from Groundsure²⁸ indicates there are no surface water abstractions within 250 m of the site.

19.5 **Radon**

Information from the BGS National Geoscience Information Service provided by Groundsure²⁸ indicates that the maximum radon potential is 1-3 %. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above Action Level of 200 Bq m⁻³.

19.6 **Quarrying, mining and landfilling**

Mines and mineral deposits

The data from Groundsure²⁸ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 19-6.

Table 19-6 - Grandpa Greene's compounds - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is not located within a coal mining area.
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and	There are no brit pits on-site or within 250 m of the site.

Category	Summary
underground mineral workings)	
Surface Ground Workings	There are three surface ground workings features on-site. There are 15 other surface ground workings features within 250 m of the site. Details are provided in Table 19-7.
Underground Workings	There are no underground workings on-site or within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 19-7 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 19-7 - Grandpa Greene's compounds - Surface ground workings

Name	Distance from site	Direction from site	Date
Canal	0 m	north-west	1890-1951
Cuttings	0 m	on-site	1904
Refuse Heap	0 m	on-site	1890-1904
Unspecified Ground Workings	19 m	north-west	1933-1951
Unspecified Ground Workings	24 m	south-west	1933-1951
Pond	34 m	north-west	1890-1948
Refuse Heap	34 m	south-east	1890
Refuse Heap	41 m	north-east	1890-1904
Unspecified Heap	41 m	north-west	1951
Pond	93 m	north	1948
Refuse Heap	101 m	north	1904
Mill Pond	124 m	west	1890-1951
Pond	167 m	south-west	1933
Mill Pond	181 m	south-west	1890
Unspecified Pit	183 m	north	1904-1948
Pond	222 m	north-east	1890-1904
Refuse Heap	230 m	east	1890-1904

Name	Distance from site	Direction from site	Date
Unspecified Ground Workings	230 m	east	1951

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high-risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²⁸ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 19-8. However, no licence details have been provided by Groundsure.

Table 19-8 - Grandpa Greene's compounds - Landfill and waste summary

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
Historical Landfill	-	-	23 m	north-west	-	-
Historical Landfill	-	-	170 m	south-west	-	-
Waste Exemptions	-	Use of waste in construction	196 m	south-east	-	-

19.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

19.8 Sensitive land uses

The data from Groundsure²⁸ indicates there are no sensitive land uses, including sites of special scientific interest (SSSIs), Ramsar or areas of conservation within 250 m of the site. The site is located within an SSSI impact zone.

19.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section emphasis on those activities within 250 m.

Pollution incidents

There are five pollution incidents reported by Groundsure²⁸ within 250 m of the site and a summary has been provided in Table 19-9.

Table 19-9 - Grandpa Greene's compounds - Pollution incidents

Type	Distance from site	Direction from site	Category of Incident: Air	Category of Incident: Land	Category of Incident: Water	Date of Incident
Pollutant not identified	99 m	south-west	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	18/06/2001
Inert Materials and Wastes: Inert Materials and Wastes: General Biodegradable Materials and Wastes	177 m	north	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	12/04/2001
General Biodegradable Materials and Wastes	177 m	north	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	12/04/2001
Sewage materials	179 m	south-east	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	12/05/2001
Oils and Fuel	211 m	south-west	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	24/08/2001

Pollution prevention and controls

The data from Groundsure²⁸ indicates there are Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site. There is one historical licensed pollutant release (Part 2A/B) located 131 m north-west of the site.

Planning hazardous substance consents

The data from Groundsure²⁸ indicates there is one Control of Major Accident Hazards (COMAH) site/planning hazardous substance within 250 m of the site. A summary has been provided in Table 19-10.

Table 19-10 - Grandpa Greene's compounds - Planning hazardous consents

Type	Site	Description	Distance from site	Direction from site	Status
List 2 Dangerous Substances		Copper, Iron, Lead, Zinc	27 m	north-west	Not Active

Radioactive substances

The data from Groundsure²⁸ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²⁸ indicates there are no recent industrial land uses on-site. There are 13 recent industrial land uses within 250 m of the site. A summary has been provided in Table 19-11.

Table 19-11 - Grandpa Greene's compounds - Contemporary trade directory

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Mast (Telecommunication)	Infrastructure and Facilities	Telecommunications Features	27 m	south-east
Business Park	Industrial Features	Business Parks and Industrial Estates	68 m	north-west
Alt Engineering	Engineering Services	Industrial Engineers	85 m	north
Diggle Motor Services Ltd	Repair and Servicing	Vehicle Repair, Testing and Servicing	85 m	north
L K Cars	Motoring	Secondhand Vehicles	85 m	north
S P S Substructure Protection Ltd	Engineering Services	Civil Engineers	85 m	north
Saddleworth Traditional Sash Windows	Industrial Products	Glass	85 m	north
Shepley Yarns	Industrial Products	Textiles, Fabrics, Silk and Machinery	85 m	north
Woolyknit	Industrial Products	Textiles, Fabrics, Silk and Machinery	85 m	north
Dene Garage Greenfield Ltd	Repair and Servicing	Vehicle Repair, Testing and Servicing	95 m	north
Electricity Substation	Infrastructure and Facilities	Electrical Features	145 m	north-west

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Factory	Industrial Features	Unspecified Works Or Factories	162 m	north-west
Mast (Telecommunication)	Infrastructure and Facilities	Telecommunications Features	172 m	north-east

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²⁸.

Contaminated land designations

According to Groundsure²⁸, there are no sites designated as contaminated land on-site or within 250 m under Part 2A of the Environmental Protection Act 1990.

19.10 Site area reconnaissance

A site walkover was undertaken on 17 March 2025 by a AtkinsRéalis environmental scientists. A summary of the observations made during the visit is provided as follows.

Table 19-12 - Grandpa Greene's compounds - Site walkover summary

Item	Description
Location	<p>The site is located on third party land in Diggle, Oldham. The site is off-track with national grid reference SE 00388 07691 and What3Words of dictation.panther.gushes.</p> <p>The site is located via the canal towpath or through a dirt access track adjacent to the Grandpa Greene's ice cream parlour on Ward Lane. The compound covers an area of approximately 0.7 ha. Warth Mill is located to the north of the site, the Huddersfield Narrow Canal bounds the compound to the west, the railway track is to the west and commercial properties are located to the south.</p>
Description of current use/ activities	The site comprises of unused vegetated land.
Fuel/chemical storage	There is no evidence of fuel storage on-site.

Item	Description
Evidence of land contamination	No evidence of land contamination was observed.
Invasive Species	No invasive species were observed during the walkover.
Surface coverage	The site comprised entirely of vegetation cover, made up of grass, trees and shrubbery. The site is relatively flat across the area, with a slight slope from the canal in the west up to the centre of the site.
Boundary Types	A low stone wall is located on the western boundary, fencing is located in the south associated with the ice cream parlour. There are no separating boundaries along the northern boundary. The eastern boundary is unknown from PRow viewpoint, however from viewpoint on Ward Lane it is assumed that dense trees and potential fencing runs along the eastern boundary.
Surface Water Features	The Huddersfield Narrow Canal runs adjacent to the western boundary, down slope from the site.

19.11 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeology and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site and future use of the site as a construction compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical developments on the site including:
 - Railway sidings; and
 - Refuse heaps.
- Off-site:
 - Historical developments surrounding the site including:
 - Unspecified mills;
 - Tanks;
 - Railway building and sidings;
 - Electricity substation;
 - Refuse heaps;
 - Mill ponds;
 - Unspecified ground workings; and
 - Ceramic works.
 - Current land uses surrounding the site including:
 - Engineers;
 - Garages;
 - Electricity substations; and
 - Factory.
 - Historical landfills:
 - 23 m north-west; and
 - 170 m south-west.
 - Pollution incidents:
 - Unidentified pollutant [90 m south-west];
 - Inert materials and wastes [177 m north];

- General biodegradable materials and waste [177 m north];
- Sewage materials [179 m south-east]; and
- Oils and fuels [211 m south-west].

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi-volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
 - Off-site:
 - Residents and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Bedrock secondary A aquifer.
 - Surface Water:
 - River Tame;

- Diggle duck pond; and
- Huddersfield Narrow Canal summit section.
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health:
 - Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- Controlled Waters:
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
- Property and Services:

- Ground gas migration and build up within confined spaces; and
- potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment

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Table 19-13 - Grandpa Greene's compounds - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>on-site</u> sources:</p> <p>Historical developments surrounding the site including:</p> <p>Railway sidings; and</p> <p>Refuse heaps.</p> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p> <p><i>Petroleum hydrocarbons</i></p> <p><i>PCBs</i></p> <p><i>Volatile organic compounds (VOCs)</i></p> <p><i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>On-site:</u></p> <p><u>Human Health</u></p> <p>–</p> <p>Construction workers</p> <p>Future site users.</p> <p><u>Property</u> –</p> <p>Compound related facilities</p> <p><u>Off-site:</u></p> <p><u>Human Health</u></p> <p>– Residents and occupiers of commercial/ industrial premises, use of public open spaces.</p> <p><u>Property and Services</u> –</p> <p>Commercial businesses and residential properties</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Based on the site history and recent land use, there is some potential for contaminants to be present in soil and groundwater on-site.</p> <p>During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. It is also unlikely that significant excavation will take place on-site as it will be used for temporary welfare/offices and storage. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses to the south of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The site is unlikely to be used after construction of the railway is complete and it is assumed that the site will be reinstated to its original condition. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p>		<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Made Ground is not recorded on the site, however may still be present, which may be a source of ground gas. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Inhalation of asbestos fibres.		Unlikely	Severe	<p>Welfare cabins are likely to have a void between the floor and ground, therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.</p> <p>Moderate/low risk</p> <p>There are no former buildings on-site reducing the likelihood of asbestos being present underlying the site.</p> <p>The majority of the site, while in use as a compound, will be covered in hardstanding or gravel therefore it is unlikely that contact with the Made Ground or infilled ground will occur. Some of the site is already in use as a storage compound, underlain by gravel. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater</u> <u>Controlled</u> <u>Waters</u> – Bedrock secondary A aquifer	Low	Medium	<p>Moderate/low risk</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through potential Made Ground and infilled ground on-site.</p> <p>There are no superficial deposits recorded on the site, increasing the potential migration of contaminants to bedrock over the site.</p> <p>As the site is being used as a storage compound, it is possible that new services (i.e. drainage) being installed for potential welfare cabins will create new preferential pathways.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					vulnerability is classed as high for the bedrock aquifer. If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water</u> <u>Controlled Waters</u> – River Tame Huddersfield Narrow Canal summit section Diggle duck pond	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is likely that leachable contaminants will migrate to the surface waters located on-site. The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater. As the site may include welfare cabins and therefore require services (i.e. drainage), there is potential for the works to create preferential pathways to the controlled waters.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources: Historical features surrounding the site including:	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers <u>Property</u> – Compound related facilities	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Historical developments surrounding the site including: Unspecified mills; Tanks;					The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
Railway building and sidings; Electricity substation; Refuse heaps; Mill ponds; Unspecified ground workings; and Ceramic works.	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
Current land uses surrounding the site including: Engineers; Garages; Electricity substations; and Factory. Historical landfills: 23 m north-west; and 170 m south-west. Pollution incidents:	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. As there are numerous sources of contamination close to the site, there is potential for contaminants to migrate to the site, via the hydraulic gradient. As the watercourses intersect the site, it is likely that any nearby contaminants would be able to reach the site. Superficial deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses, or private water supplies are recorded within 250 m of the site.
	Migration of gases into confined		Low	Medium	Moderate/low risk

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Unidentified pollutant [90 m south-west]; Inert materials and wastes [177 m north]; General biodegradable materials and waste [177 m north]; Sewage materials [179 m south-east]; and Oils and fuels [211 m south-west].	spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).				Historical landfills are located within 100 m of the site, which could be a potential source of ground gas. Due to the proximity of the historical landfill, migration to the site is possible. However, the landfill is underlain by cohesive superficial deposits and is also located on the other side of the Huddersfield Narrow Canal from the site, which will limit migration. No coal seams are located within 250 m of the site.
Possible contaminants include: Asbestos Metals PAHs Petroleum hydrocarbons VOCs PCBs Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)					

19.12 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

20. BASELINE FOR SAM ROAD COMPOUND

20.1 Site history

Table 20-1 provides a summary of the historical development at the site and the surrounding area within 250 m of the site boundary which may represent potential sources of contamination. The history of the site and surrounding area (within 250 m of the site) has been determined principally by reference to historical maps obtained from Groundsure²⁸.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 20-1 – Sam Road Compound - Historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Railway Sidings	1890-1951	0 m	on-site
Refuse Heap	1890-1904	0 m	on-site
Unspecified Mill	1951	0 m	on-site
Unspecified Mills	1890-1980	0 m	on-site
Railway Sidings	1890-1951	2 m	south-east
Unspecified Ground Workings	1933-1951	17 m	west
Unspecified Pit	1904-1948	20 m	north-west
Railway Building	1890-1951	26 m	south-east
Refuse Heap	1890-1904	27 m	south-west
Railway Building	1890	30 m	north-east
Railway Sidings	1890-1951	38 m	south-east
Ceramics Works	1904-1951	76 m	south-east
Railway Building	1890-1951	92 m	east
Unspecified Mill	1890	100 m	south-east
Unspecified Works	1933-1980	100 m	south-east
Railway Building	1890	108 m	north-east
Unspecified Ground Workings	1951	116 m	south-east
Refuse Heap	1890-1904	125 m	south-east

Feature	Date	Distance from site boundary	Direction from site boundary
Unspecified Tank	1951-1965	130 m	north-east
Unspecified Disused Mill	1890-1948	135 m	north-east
Railway Sidings	1890-1951	142 m	south-west
Refuse Heap	1890-1904	143 m	south-west
Warth Mill	1951	150 m	south-west
Unspecified Tanks	1904-1906	166 m	west
Railway Building	1890-1951	176 m	north-east
Tunnels	1890-1980	185 m	north-east
Mill Pond	1933-1951	195 m	north-east
Refuse Heaps	1890	195 m	south-west
Cuttings	1904	199 m	south-west
Mill Ponds	1951	199 m	south-east
Electricity Substation	1951	203 m	south-west

20.2 Published geology

A summary of the published geology relevant to the Sam Road Compound site is provided below. The data has been sourced from Groundsure²⁸ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not present on-site. Made Ground is recorded within 250 m of the site; the closest instance is recorded as 6 m west of the site.

Superficial deposits

The 1:10,000 scale published geology maps indicate that there is Alluvium at the south boundary of the site. Superficial deposits are not recorded underlying the rest of the site.

Bedrock

The 1:10,000 scale published geology maps indicate there is one bedrock geology designation on-site, Shale Grit. There are no other bedrock geology designation within 250 m of the site.

Bedrock formations up to 250 m away are present in Figure 21-1; beyond the 250 m buffer, no bedrock information is included in this report.



Figure 20-1 - Sam Road Compound – Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there is one bedrock fault on-site. There is one fault within 250 m of the site. Details are provided in Table 20-2 and faults are visible in Figure 21-1.

Table 20-2 - Sam Road Compound - Bedrock fault summary

Description	Distance from site boundary	Direction from site boundary
Normal fault, inferred; crossmarks on downthrow side	0 m	on-site
Normal fault, inferred; crossmarks on downthrow side	178 m	west

20.3 Hydrogeology

Superficial aquifers

The data from Groundsure²⁸ indicates that a secondary A superficial aquifer underlies the south of the site.

Bedrock aquifers

The data from Groundsure²⁸ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure²⁸ data indicates that the groundwater vulnerability is high for the bedrock aquifer and the superficial aquifer. A high classification is assigned to areas which are “able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits”.

Groundwater source protection zones

The data from Groundsure²⁸ and MAGIC website⁴ both indicate that the site is not 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²⁸ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²⁸ indicates there are no licensed discharges to groundwater features on-site or within 250 m of the site.

20.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²⁸ as the Huddersfield Narrow Canal summit section, located on-site. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site has been provided in Table 20-3.

Table 20-3 - Sam Road Compound - Surface watercourses

Name of Watercourse	Type	Distance from Site	Direction from Site	WFD Overall Classification
Huddersfield Narrow Canal summit section	Canal	0 m	on-site	Moderate
Diggle Brook	River	30 m	south	-
Unnamed watercourse	On ground surface watercourse	250 m	west	-

Surface water discharge consents

The data from Groundsure²⁸ indicates there are no licensed discharge to surface water features on-site or within 250 m of the site. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Surface water abstractions

The data from Groundsure²⁸ indicates there are no surface water abstractions within 250 m of the site.

20.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²⁸ indicates that the maximum radon potential is 1-3 %. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above Action Level of 200 Bq m⁻³.

20.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure [1] records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 20-4.

Table 20-4 - Sam Road Compound - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is not located within a coal mining area.

Category	Summary
Non-Coal Mining Features	There is one non-coal mining area on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and underground mineral workings)	There are no brit pits on-site or within 250 m of the site.
Surface Ground Workings	There are two surface ground workings features on-site. There are 15 other surface ground workings features within 250 m of the site. Details are provided in Table 20-5.
Underground Workings	There are no underground workings on-site. There is one underground working within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 20-5 provides further detail on each mineral exploitation feature and the relative distance and direction from the site boundary.

Table 20-5 - Sam Road Compound - Surface ground workings

Name	Distance from site	Direction from site	Date
Canal	0 m	on-site	1890-1951
Refuse Heap	0 m	on-site	1890
Unspecified Ground Workings	17 m	west	1933-1951
Pond	18 m	south-east	1904
Refuse Heap	27 m	south-west	1904
Pond	30 m	south-west	1948
Pond	44 m	south-east	1890-1951
Refuse Heap	64 m	south-west	1904
Unspecified Ground Workings	116 m	south-east	1951

Name	Distance from site	Direction from site	Date
Refuse Heap	129 m	south-east	1890-1904
Refuse Heap	143 m	south-west	1890
Pond	181 m	south-west	1890-1948
Tunnels	185 m	north-east	1890-1980
Mill Pond	189 m	north-east	1890-1951
Refuse Heaps	195 m	south-west	1890
Cuttings	199 m	south-west	1904
Mill Ponds	199 m	south-east	1951

The Mining Remediation Authority viewer⁶ indicates that the site is not within a high-risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²⁸ records landfills/waste management facilities within 250 m of the site. A summary of all historical and current landfills and waste sites has been provided in Table 20-6. However, no licence details have been provided by Groundsure.

Table 20-6 - Sam Road Compound - Landfill and waste summary

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
Historical Landfill		-	174 m	south-west	-	-
Waste Exemptions	Npa - Lee Side Diggle Oldham OL3 5jy	Deposit of waste from dredging of inland waters	93 m	north-east	-	-
Waste Exemptions	-	Use of waste in construction Use of mulch	202 m	north-east	-	-
Waste Exemptions	Sunfield Stables Diglea Oldham OL3 5LA	Burning waste in the open	226 m	east		
		Use of waste for a specified purpose	226 m	east		
		Burning of waste as a fuel	226 m	east		

Category	Site Name or Address	Description of Waste	Distance from site	Direction from site	Licence Issue Date	Licence Status
		in a small appliance				
		Spreading waste on agricultural land to confer benefit	226 m	east		
		Use of mulch	226 m	east		
		Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising	226 m	east		
		Deposit of waste from dredging of inland waters	226 m	east		
		Spreading of plant matter to confer benefit	238 m	east		
		Incorporation of ash into soil	238 m	east		
		Pig and poultry ash	238 m	east		
		Treatment of sheep dip for disposal	238 m	east		
		Treatment of kitchen waste in a wormery	238 m	east		
		Treatment of waste in a biobed or biofilter	238 m	east		
		Use of waste in construction	238 m	east		
		Use of waste derived biodiesel as fuel	238 m	east		

20.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

20.8 Sensitive land uses

The data from Groundsure²⁸ indicates there are no sensitive land uses, including sites of special scientific interest (SSSIs), Ramsar or areas of conservation within 250 m of the site. The site is located within an SSSI impact zone.

20.9 Regulatory information

Regulated activities within 250 m of the site could, depending upon their nature, represent potential off-site sources of contamination. Whilst a 1 km search area was generally adopted; this section emphasis on those activities within 250 m.

Pollution incidents

There are three pollution incidents reported by Groundsure²⁸ within 250 m of the site and a summary has been provided in Table 20-7.

Table 20-7 - Sam Road Compound - Pollution incidents

Type	Distance from site	Direction from site	Category of Incident: Air	Category of Incident: Land	Category of Incident: Water	Date of Incident
Sewage Materials	124 m	south-east	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	28/07/2003
General Biodegradable Materials and Wastes	157 m	west	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	12/04/2001
Inert Materials and Wastes	157 m	west	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	12/04/2001

Pollution prevention and controls

The data from Groundsure²⁸ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²⁸ indicates there are no Control of Major Accident Hazards (COMAH) sites/planning hazardous consents within 250 m of the site.

Radioactive substances

The data from Groundsure²⁸ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²⁸ indicates there are no recent industrial land uses on-site. There are nine recent industrial land uses within 250 m of the site. A summary has been provided in Table 20-8.

Table 20-8 - Sam Road Compound - Contemporary trade directory

Site	Industrial Land Use Category	Description	Distance from site	Direction from site
Mast (Telecommunication)	Infrastructure and Facilities	Telecommunications Features	53 m	south
Dene Garage Greenfield Ltd	Repair and Servicing	Vehicle Repair, Testing and Servicing	188 m	west
Alt Engineering	Engineering Services	Industrial Engineers	191 m	south-west
Diggle Motor Services Ltd	Repair and Servicing	Vehicle Repair, Testing and Servicing	191 m	south-west
L K Cars	Motoring	Secondhand Vehicles	191 m	south-west
S P S Substructure Protection Ltd	Engineering Services	Civil Engineers	191 m	south-west
Saddleworth Traditional Sash Windows	Industrial Products	Glass	191 m	south-west
Shepley Yarns	Industrial Products	Textiles, Fabrics, Silk and Machinery	191 m	south-west
Woolyknit	Industrial Products	Textiles, Fabrics, Silk and Machinery	191 m	south-west

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²⁸.

Contaminated land designations

According to Groundsure²⁸, there are no sites designated as contaminated land on-site or within 250 m under Part 2A of the Environmental Protection Act 1990.

20.10 Initial conceptual site model

Through a review of available historical and published information (e.g. geological, hydrogeology and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of existing site and future use of the site as a construction compound. It is assumed that the compound will be returned to the current site condition following construction works.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical developments on the site including:
 - Railway sidings;
 - Refuse heap; and
 - Unspecified mills.
- Off-site:
 - Historical developments surrounding the site including:

- Railways buildings and sidings;
- Refuse heaps;
- Ceramics works;
- Unspecified mills;
- Unspecified works;
- Tanks;
- Mill ponds;
- Tunnels; and
- Electricity substation.
- Current land uses surrounding the site including:
 - Garages; and
 - Engineers.
- Historical landfills:
 - 174 m south-west.
- Pollution incidents:
 - 124 m south-east;
 - 157 m west.

Potential contaminants associated with the above sources include:

- Inorganics including metals and metalloids, asbestos, cyanide, sulphate, ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), volatile and semi-volatile organic compounds (VOCs/SVOCs); and
- ground and landfill gases.

Potential receptors

The following receptors have been identified at the site based on a future public open space end use and during construction works:

- Human Health:
 - On-site:
 - Construction workers associated with the construction of the site; and
 - Future site users.
 - Off-site:
 - Residents and occupiers of commercial/ industrial premises; and
 - Users of public open space areas.
- Controlled Waters:
 - Groundwater:
 - Bedrock secondary A aquifer; and
 - Superficial secondary A aquifer.
 - Surface Water:
 - Diggle Brook;
 - Huddersfield Narrow Canal summit section; and
 - Unnamed watercourse.
- Property and Services:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health:

- Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
 - ingestion of contaminated soils, soil-derived dust and groundwater;
 - dermal contact with soil, soil-derived dust and groundwater; and
 - inhalation of organic vapours (e.g. from fuel spills) and ground/landfill gas.
- **Controlled Waters:**
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - migration of groundwater to the Huddersfield narrow canal west section and the River Tame;
 - migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
 - surface water run-off.
 - **Property and Services:**
 - Ground gas migration and build up within confined spaces; and
 - potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during

the construction works and acute risks to construction workers/site visitors
have therefore not been considered as part of this assessment

Table 20-9 - Sam Road Compound - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<p>Potential contaminants in soil/groundwater on-site, originating from the following <u>on-site</u> sources:</p> <p>Historical developments surrounding the site including:</p> <p>Railway sidings; Refuse heap; and Unspecified mills.</p> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p> <p><i>Petroleum hydrocarbons</i></p> <p><i>PCBs</i></p> <p><i>Volatile organic compounds (VOCs)</i></p> <p><i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i></p>	<p>Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.</p>	<p><u>On-site:</u></p> <p><u>Human Health</u></p> <p>–</p> <p>Construction workers</p> <p>Future site users.</p> <p><u>Property</u> –</p> <p>Compound related facilities</p> <p><u>Off-site:</u></p> <p><u>Human Health</u></p> <p>– Residents and occupiers of commercial/industrial premises, use of public open spaces.</p> <p><u>Property and Services</u> –</p> <p>Commercial businesses and residential properties</p>	<p>Low</p>	<p>Medium</p>	<p>Moderate/low risk</p> <p>Based on the site history and recent land use, there is the potential for contaminants to be present in soil and groundwater on-site.</p> <p>During the site's use as a construction compound it is expected that the site surface will be predominately gravel cover or hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. It is also unlikely that significant excavation will take place on-site as it will be used for temporary welfare/offices and storage. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. However, there are businesses in the north/north-west area of the site. Dust suppression measures may be required to minimise the migration of dust off-site during construction.</p> <p>The site is unlikely to be used after construction of the railway is complete and it is assumed that the site will be reinstated to its original condition. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p>
	<p>Inhalation of vapours.</p> <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p>		<p>Unlikely</p>	<p>Medium</p>	<p>Low Risk</p> <p>Made Ground is not present on the site, reducing the potential for ground gas. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to enclosed spaces on the site.</p>

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
	Inhalation of ground gas (asphyxiation).				Welfare cabins are likely to have a void between the floor and ground; therefore ingress of gas is unlikely to be sufficient to pose an unacceptable risk.
	Inhalation of asbestos fibres.		Low	Severe	Moderate risk Former buildings on-site increase the likelihood of asbestos being present from demolition of these structures. Based on the potential presence of asbestos in made ground, that is associated with potential former building demolitions, additional ground investigation is required to substantiate or discount this potential risk. The majority of the site, while in use as a compound, will be covered in hardstanding or gravel therefore it is unlikely that contact with the Made Ground or infilled ground will occur. Some of the site is already in use as a storage compound, underlain by gravel. It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	Groundwater <u>Controlled Waters</u> – Bedrock secondary A aquifer Superficial secondary A aquifer	Low	Medium	Moderate/low risk The level of risk will be dependent on the potential for contaminants to migrate through potential Made Ground and infilled ground on-site. Superficial deposits are only recorded in the south of the site, increasing the potential for migration of contaminants to bedrock over the site. As the site is being used as a storage compound, it is possible that new services (i.e. drainage) being installed for potential welfare cabins will create new preferential pathways. The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
					vulnerability is classed as high for the bedrock aquifer and for the superficial aquifers If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	<u>Surface Water</u> <u>Controlled Waters</u> – Huddersfield Narrow Canal summit section Diggle Brook Unnamed watercourse	Low	Medium	Moderate/low risk Due to the distance between the site and the surface water bodies, it is possible that leachable contaminants will migrate to the surface waters located on-site. The Huddersfield Narrow Canal west section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater. As the site may include welfare cabins and therefore require services (i.e. drainage), there is potential for the works to create preferential pathways to the controlled waters.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources: Historical developments	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers <u>Property</u> – Compound related facilities	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
surrounding the site including: Railways buildings and sidings; Refuse heaps; Ceramics works; Unspecified mills; Unspecified works; Tanks; Mill ponds; Tunnels; and Electricity substation. Current land uses surrounding the site including: Garages; and Engineers. Historical landfills: 174 m south-west. Pollution incidents: 124 m south-east; 157 m west.	Inhalation of airborne asbestos fibres.		Unlikely	Severe	The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
Possible contaminants include: Asbestos Metals PAHs	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.		Low	Medium	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
	Migration of gases into confined spaces/buildings and		Low	Medium	Moderate/low risk A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. As there are numerous sources of contamination close to the site, there is potential for contaminants to migrate to the site. As the watercourse intersects the site, it is likely that any nearby contaminants would be able to reach the site. Superficial deposits present between potential Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.

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Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
<i>Petroleum hydrocarbons</i> <i>VOCs</i> <i>PCBs</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	accumulation (explosion). Inhalation of ground gas (asphyxiation).				gas. Due to the proximity of the historical landfill, migration to the site is not likely. The landfill is underlain by cohesive superficial deposits which will limit migration. No coal seams are located within 250 m of the site.

20.11 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

Based on the initial conceptual site model, there are potential risks to future site users and this should be mitigated through ground investigation and further assessment. Following further ground investigation, an interpretative report including risk assessments (human health, controlled waters and gas, where applicable) will be undertaken to assess and confirm the potential impacts from contamination and to identify further mitigation measures that have not already been identified. Further recommendations will also be provided to allow the redevelopment of the site. If, following ground investigation and further assessment, there are remaining unacceptable risks, further mitigation may be required which could include remediation of contamination hot spots or provision of clean, capping layers in soft landscaping.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If

risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

21. BASELINE FOR DIGGLE ACCESS AND DIVERSION ROUTE

21.1 Site history

Table 21-1 provides a summary of the historical development at the Diggle site and the surrounding 250 m buffer area which may represent potential sources of contamination. The history of the site and the surrounding 250 m area has been determined principally by reference to historical maps obtained from Groundsure²⁷.

Historical development categorised as historical industrial land use was derived from 1:10,000 and 1:10,560 historical Ordnance Survey (OS) maps. All other historical development data, including tanks, energy features, petrol stations, and garages, were derived from 1:2,500 and 1:1,250 scale historical maps. Military land features are derived from these small-scale maps in addition to a variety of pertinent sources, including National Archives, Local Authority records, and Ministry of Defence Records.

Table 21-1 – Diggle Access and Diversion Route - Historical development

Feature	Date	Distance from site boundary	Direction from site boundary
Tunnels	1890-1980	0 m	on-site
Railway Sidings	1890--1951	4 m	north-west
Mill Pond	1890-1948	12 m	south-west
Railway Building	1890-1951	17 m	north-west
Unspecified Mill	1890, 1904, 1948	27 m	north-east
Unspecified Tank	1951-1965	47 m	south-west
Railway Station	1904-1951	49 m	south-west
Unspecified Heap	1890-1951	50 m	north-west
Disused Grove Mill	1933-1951	52 m	north
Unspecified Disused Mill	1890-1980	65 m	west
Railway Building	1890	74 m	south-west
Mill Pond	1904-1951	79 m	north-west
Old quarry	1890	82 m	north-west
Railway Building	1890-1951	88 m	south-west
Mitchell Mill (woolen)	1951	91 m	south-west
Railway Sidings	1890-1951	96 m	south-west

²⁷ Groundsure 2025, Enviro + Geo Insight (GS-2FF-J4C-8W8-RF2)

Feature	Date	Distance from site boundary	Direction from site boundary
Tanks	1904-1993	111 m	north-west
Railway Building	1890	127 m	south-west
Harrop Court Mill (woollen)	1893-1995	145 m	west
Unspecified Mills	1951-1980	187 m	south-west
Ceramic Works	1904-1980	204 m	south-west
Refuse Heap	1904-1948	220 m	north-east
Railway Building	1904-1951	226 m	south-west
Refuse Heap	1933-1951	233 m	south-east
Mill Ponds	1890-1951	235 m	south
Diggle Mill (paper)	1890-1951	242 m	south-west

21.2 Published geology

A summary of the published geology relevant to the Diggle Access and Diversion Route is provided below. The data has been sourced from Groundsure²⁹ and the British Geological Survey (BGS) GeoIndex³.

Artificial geology

The 1:10,000 scale published geology maps indicate that Made Ground is not recorded on-site. Made Ground is recorded within 250 m of the site, the closest instance is recorded as 9 m north-west.

Superficial deposits

The 1:10,000 scale published geology maps indicate that there are no superficial deposits underlying the site. Alluvium is recorded 173 m south of the site.

Bedrock

The 1:10,000 scale published geology indicates there are two bedrock geology designations on the site. There are no additional bedrock formations recorded within 250 m of the site.

A summary of the bedrock geology encountered on-site is provided in Table 21-2. Figure 22-1 presents bedrock formations up to 250 m away from the site; beyond the 250 m buffer, no bedrock information is included in this report.

Table 21-2 - Diggle Access and Diversion Route - Bedrock geology summary

Description	Distance from site boundary	Direction from site boundary	Additional details
Hebden Formation	0 m	on-site	Mudstone And siltstone
Shale Grit	0 m 207 m	on-site west	Sandstone



Figure 21-1 - Diggle Access and Diversion Route - Summary of bedrock and linear features

Faults and linear features

The 1:10,000 scale published geology indicates there are three bedrock fault on the site and one other within 250 m of the site. Details are provided in Table 21-3 and faults are visible in Figure 22-1.

Table 21-3 - Diggle Access and Diversion Route - Faults and linear features

Description	Distance from site boundary	Direction from site boundary
Normal fault, inferred; crossmarks on downthrow side	0 m	on-site
Normal fault, inferred; crossmarks on downthrow side	207 m	west

21.3 Hydrogeology

Superficial aquifers

The data from Groundsure²⁹ indicates there are no designated superficial aquifers on-site. A secondary A aquifer is located 172 m south of the site.

The Environment Agency describes a secondary A aquifer as “Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.”

Bedrock aquifers

The data from Groundsure²⁹ indicates that the site and surrounding area is underlain by a secondary A bedrock aquifer.

Groundwater vulnerability

Groundsure²⁹ data indicates that the groundwater vulnerability is medium for the bedrock aquifer. Medium vulnerability indicates that the groundwater is an intermediate between high (areas easily able to transmit pollution to groundwater) and low (areas that provide the greatest protection from pollution).

Groundwater source protection zones

The data from Groundsure²⁹ and MAGIC website⁴ both indicate that the site is not within 250 m of a Groundwater Source Protection Zone.

Groundwater abstractions

The data from Groundsure²⁹ indicates that there are no groundwater abstraction licenses within 250 m of the site.

Groundwater discharge consents

The data from Groundsure²⁹ indicates there are no licensed discharge consents to groundwater on-site or within 250 m of the site.

21.4 Hydrology

Surface watercourses

The nearest surface watercourse is recorded by Groundsure²⁹ as the Huddersfield Narrow Canal summit section, which is located on-site. A summary of all surface watercourses (rivers, lakes, canals, and coastal and transitional waters) within 250 m of the site have been provided in Table 21-4.

Table 21-4 - Diggle Access and Diversion Route - Surface watercourses

Name of watercourse	Type	Distance from site boundary (m)	Direction from site boundary	WFD overall classification
Huddersfield Narrow Canal summit section	Canal	0 m	on-site	Moderate
Unnamed watercourse	On ground surface watercourse	10 m	north-west	-
Tame (Source to Chew Brook)	River	215 m	south	Moderate

Surface water discharge consents

The data from Groundsure²⁹ indicates there are no licensed discharge to surface water features on-site or within 250 m of the site. In addition, there are no pollutant release to surface water features on-site or within 250 m of the site.

Surface water abstractions

The data from Groundsure²⁹ indicates there are no surface water abstractions on-site or within 250 m of the site.

21.5 Radon

Information from the BGS National Geoscience Information Service provided by Groundsure²⁹ indicates that the maximum radon potential is 1-3%. The UK Radon Map⁵ indicates that this results in a 1-3% chance of a house having a radon concentration at or above the Action Level of 200 Bq m⁻³.

21.6 Quarrying, mining and landfilling

Mines and mineral deposits

The data from Groundsure²⁹ records sites of coal mining, mineral exploitation, and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 21-5.

Table 21-5 - Diggle Access and Diversion Route - Mineral exploitation summary

Category	Summary
Coal seams (derived from 1:10,000 and 1:50,000 scale maps)	There are no coal seams on the site or within 250 m of the site.
Coal Mining Areas	The site is not located within a coal mining area.
Non-Coal Mining Features	There are two non-coal mining areas on-site, for vein mineral. There are no other non-coal mining areas within 250 m of the site.
British Pits (active or closed surface and underground mineral workings)	There are no brit pits on-site or within 250 m of the site.
Surface Ground Workings	There are no surface ground workings features on-site. There are nine other surface ground workings features within 250 m of the site. Details are provided in Table 21-6.
Underground Workings	There is one underground workings on-site. There are no other underground workings within 250 m of the site.
Historical Mineral Planning Areas	There are no historical mineral planning areas on-site or within 250 m of the site.

Table 21-6 provides further details on surface ground workings and the relative distance from the site boundary.

Table 21-6 - Diggle Access and Diversion Route - Surface ground workings

Name	Distance from site boundary	Direction from site boundary	Date
Tunnels	0 m	on-site	1890-1980
Mill Pond	12 m	south-west	1890-1948
Unspecified Heap	50 m	north-west	1890-1951
Pond	75 m	north	1890-1980
Unspecified Pit	82 m	north-west	1890
Pond	122 m	south-west	1890-1980
Refuse Heap	220 m	north-east	1904-1951
Mill Ponds	243 m	south	1933-1951
Unspecified Ground Workings	243 m	south-west	1933-1951
Pond	246 m	south-west	1890

The Mining Remediation Authority⁶ viewer indicates the site is not within a high risk development area.

Historical and current landfills and waste management facilities

The data from Groundsure²⁹ records no landfills/waste management facilities within 250 m of the site. There are waste exemptions within 250 m of the site. A summary of all waste exemptions has been provided in Table 21-7.

Table 21-7 - Diggle Access and Diversion Route - Landfill and waste summary

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary
Waste Exemptions	-	Use of mulch	5 m	north-west
		Use of waste in construction		
Waste Exemptions	Sunfield Stables, Diggle, Diggle, Oldham, OL3 5LA	Incorporation of ash into soil	63 m	south-east
		Use of waste in construction		
		Burning of waste as a fuel in a small appliance		
		Treatment of waste wood and		

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary
		waste plant matter by chipping, shredding, cutting or pulverising		
		Deposit of waste from dredging of inland waters		
		Pig and poultry ash		
		Use of waste derived biodiesel as fuel		
		Spreading of plant matter to confer benefit		
		Spreading waste on agricultural land to confer benefit		
		Use of mulch		
		Treatment of sheep dip for disposal		
		Treatment of waste in a biobed or biofilter		
		Burning waste in the open		
		Treatment of kitchen waste in a wormery		
Waste Exemptions	Npa - Lee Side Diggle Oldham OL3 5JY	Deposit of waste from dredging of inland waters	98 m	south-west
Waste Exemptions	Ridge Farm, Ridge Lane, Diggle, Oldham, OL3 5lr	Storage of waste in secure containers	200 m	north-west
		Use of waste for a specified purpose		
		Treatment of waste wood and		

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary
		waste plant matter by chipping, shredding, cutting or pulverising		
		Spreading of plant matter to confer benefit		
		Burning waste in the open		
		Spreading waste on agricultural land to confer benefit		
		Use of waste in construction		
		Burning of waste as a fuel in a small appliance		
		Storage of sludge		
		Storage of waste in a secure place		
		Spreading waste on agricultural land to confer benefit		
Waste Exemptions	Thurstons Farm, Ridge Lane, Diggle, Oldham, O13 5lr	Deposit of agricultural waste consisting of plant tissue under a Plant Health notice	246 m	north-west
		Disposal by incineration		
		Use of waste in construction		
		Burning of waste as a fuel in a small appliance		
		Cleaning, washing, spraying or coating relevant waste		

Category	Site name or address	Description of waste	Distance from site boundary	Direction from site boundary
		Burning waste in the open		
		Cleaning, washing, spraying or coating relevant waste		
		Use of waste for a specified purpose		
		Deposit of waste from a portable sanitary convenience		
		Screening and blending of waste		
		Aerobic composting and associated prior treatment		
		Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising		
		Deposit of waste from dredging of inland waters		

21.7 Unexploded bombs (UXB)

According to freely available online risk maps⁸, there is a low risk of UXB on the site.

21.8 Sensitive land uses

The data from Groundsure²⁹ indicates that there are no sites of special scientific interest (SSSIs), Ramsar sites, areas of conservation within 250 m of the site. The site is located within a SSSI impact zone.

21.9 Regulatory information

Regulated activities within 250 m of the Order Scheme Boundary could, depending upon their nature, represent potential off-site sources of

contamination. Whilst a 1 km search area was generally adopted; this section places emphasis on those activities within 250 m.

Pollution incidents

There is one pollution incident reported by Groundsure²⁹ within 250 m of the site and a summary has been provided in Table 21-8.

Table 21-8 - Diggle Access and Diversion Route - Pollution incidents

Type	Distance from site boundary	Direction from site boundary	Category of incident: air	Category of incident: land	Category of incident: water	Date of incident
Sewage Materials	229 m	south	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	28/07/2003

Pollution prevention and controls

The data from Groundsure²⁹ indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications, including pollution prevention substances, licensed pollutant release, historical and current licensed industrial activities, within 250 m of the site.

Planning hazardous substance consents

The data from Groundsure²⁹ indicates there are no Control of Major Accident Hazards (COMAH) sites or planning hazardous substance consents within 250 m of the site.

Radioactive substances

The data from Groundsure²⁹ indicates there are no radioactive substance authorisation features on-site or within 250 m of the site.

Recent industrial land uses

The data from Groundsure²⁹ indicates there are no recent industrial land uses on-site. There are two recent land uses within 250 m of the site. A summary has been provided in Table 21-9.

Table 21-9 - Diggle Access and Diversion Route - Contemporary trade directory

Site	Industrial land use category	Description	Distance from site boundary	Direction from site boundary
Tank	Industrial Features	Tanks (Generic)	117 m	north-west
Tank	Industrial Features	Tanks (Generic)	119 m	north-west

Active and current petrol stations

There are no fuel stations recorded within 250 m of the site indicated by Groundsure²⁹.

Contaminated land designations

According to Groundsure²⁹, there are no sites designated as contaminated land under Part 2A of the Environment Protection Act 1990 on-site or within 250 m of the site.

21.10 Initial conceptual site model

Through a review of historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted are then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

A number of historical and current land uses have been identified on-site and within 250 m of the site which may have given rise to contamination.

The risk assessment has been undertaken in consideration of the existing land use and future use of the site as a diversion route.

Potential sources

Based on the review of available information, the following key potentially contaminative sources have been identified within the site boundary and in close proximity to the site.

- On-site:
 - Historical developments including:

- Tunnel
- Off-site:
 - Historical development surrounding the site including:
 - Railway buildings and sidings;
 - Mill ponds;
 - Tanks;
 - Woollen mills;
 - Old quarry;
 - Refuse heaps; and
 - Ceramic works.
 - Current features surrounding the site including:
 - Tanks
 - Pollution incidents:
 - 229 m south.

Potential contaminants associated with the above sources include:

- inorganics including metals and metalloids, asbestos, cyanide, sulphate and ammonia;
- organics including phenols, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile and semi-volatile organic compounds (VOCs/SVOCs); and
- ground gases

Potential receptors

The following receptors have been identified at the site based on an open space end use:

Human Health

- On-site:

- Construction workers associated with the construction of the site; and
 - Future users of the site.
- Off-site:
 - Resident and occupiers of commercial/industrial premises; and
 - Users of open space areas.

Controlled Waters

- Groundwater:
 - Secondary A bedrock aquifer
- Surface water:
 - Unnamed watercourse;
 - River Tame; and
 - Huddersfield Narrow Canal summit section

Property and Services

- Off-site: commercial businesses and residential properties.

Potential pathways

Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

Human Health

- Inhalation of soil and soil-derived dust, asbestos and soil and groundwater deposits;
- ingestion of contaminated soils, soil-derived dust and groundwater;

- dermal contact with soil, soil-derived dust and groundwater; and
- inhalation of organic vapours (e.g. from fuel spills) and ground gas.

Controlled Waters

- Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
- lateral and vertical migration through permeable deposits in made ground and bedrock (e.g. sandstone and/or highly fractured rock);
- migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams; and
- surface water run-off.

Property and Services

- Ground gas migration and build up within confined spaces; and
- potable water pipes.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations⁹ which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate/manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers/site visitors have therefore not been considered as part of this assessment.

Table 21-10 - Diggle Access and Diversion Route - Initial conceptual site model

Sources	Pathway	Receptor	Probability	Consequence	Classification of Risk
Potential contaminants in soil/groundwater on-site, originating from the following on-site sources: Historical developments surrounding the site including: Tunnel. Possible contaminants include: <i>Asbestos</i> <i>Metals</i> <i>Polycyclic aromatic hydrocarbons (PAHs)</i> <i>Petroleum hydrocarbons</i> <i>Volatile organic compounds (VOCs)</i> <i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers Future of the site. <u>Off-site:</u> <u>Human Health</u> – Residents and occupiers of commercial/ industrial premises, use of public open spaces.	Low	Medium	Moderate/low risk Based on the site history and recent land use, there is limited potential for contaminants to be present in soil and groundwater on-site. During the site's use as diversion route it is expected that the site surface will be hardstanding, therefore the likelihood of exposure to underlying Made Ground is low. Significant excavation may be required on-site in order to position the access route. It is considered unlikely that the public will have access to the area during construction providing the appropriate controls are put in place. Dust suppression measures may be required to minimise the migration of dust off-site during construction. The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.
	Inhalation of vapours. Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).	<u>Property and Services</u> – Commercial businesses and residential properties	Unlikely	Medium	Low Risk Made Ground is not present on the site, reducing the potential for ground gas. The proposed works do not require the installation of any new services therefore, no new migration pathways will be introduced.
	Inhalation of asbestos fibres.		Unlikely	Severe	Moderate/low risk As there are no former buildings on-site, it is unlikely that asbestos will be present in the soils underlying the site. The majority of the site will be covered in hardstanding or gravel therefore it is unlikely that

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					<p>contact with the Made Ground or infilled ground will occur.</p> <p>It is assumed that future construction/maintenance workers will wear appropriate PPE and that they will have conducted a safety risk assessment including consideration of ground conditions which will reduce the risk to human health.</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off-site receptors should be negligible</p>
	Leaching or dissolution of contaminants in unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock. Migration via preferential pathways e.g. existing drainage, foul sewer, proposed service pipes/trenches, piled foundations.	<u>Groundwater Controlled Waters</u> – Bedrock secondary A aquifer	Low	Medium	<p>Moderate/low risk</p> <p>The level of risk will be dependent on the potential for contaminants to migrate through potential Made Ground and infilled ground on-site.</p> <p>There are no superficial deposits recorded on the site, increasing the potential for migration of contaminants to bedrock over the site.</p> <p>No new services (i.e. drainage) are being installed, therefore there will be no preferential pathways for the migration of contaminants.</p> <p>The site is not located within a Groundwater Source Protection Zone (SPZ). The groundwater vulnerability is classed as medium for the bedrock aquifer.</p> <p>If significant Made Ground is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock aquifer. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.</p>
	Leaching or dissolution of contaminants in	<u>Surface Water Controlled Waters</u> –	Low	Medium	<p>Moderate/low risk</p> <p>Due to the distance between the site and the surface water bodies, it is possible that leachable</p>

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	unsaturated soils and subsequent migration Lateral and vertical migration through Made Ground, superficial deposits and bedrock Surface water run-off. Migration of contaminated water in drainage ditches to controlled surface waters.	Huddersfield Narrow Canal summit section River Tame Unnamed watercourse			contaminants will migrate to the surface waters located on-site. The Huddersfield Narrow Canal summit section is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. Where hardstanding will be present in the proposed development, the infiltration from precipitation will be reduced which will in turn reduce the mobilisation of leachate by rainwater.
Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources: Historical development surrounding the site including: Railway buildings and sidings; Mill ponds; Tanks; Woollen mills; Old quarry; Refuse heaps; and Ceramic works.	Inhalation, ingestion and dermal contact with contaminants in soil derived dust.	<u>On-site:</u> <u>Human Health</u> – Construction workers <u>Property</u> – Compound related facilities	Unlikely	Medium	Low Risk Based on the off-site history and recent land use, there is the potential for contaminants to be present in soils and groundwater off-site. It is unlikely that there will be future site users once construction is complete therefore it is unlikely that people will come into contact with contaminants via windblown dust where there are areas immediately off-site not covered with hardstanding, buildings or vegetation. The site is surrounded by residential and commercial properties that may also come into contact with windblown dust if appropriate dust suppression measures are not utilised. It is assumed that site construction/maintenance workers will wear appropriate PPE and a safety risk assessment will be conducted.
	Inhalation of airborne asbestos fibres.		Unlikely	Severe	Moderate/low risk Asbestos may have been present in former off-site structures/buildings. Therefore, there is the potential for asbestos to be present within Made Ground near the site. However, it is unlikely that the contaminants

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Current features surrounding the site including:					would migrate onto site within windblown dust as the majority of the surrounding current and historical industrialised areas is covered in hardstanding and/or vegetation.
Tanks					
Pollution incidents: 229 m south.			Low	Medium	Moderate/low risk
<i>Possible contaminants include:</i>	Leaching of contaminants from soil and migration to groundwater, followed by lateral migration beneath the site.				A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses.
<i>Asbestos</i>					As there are numerous sources of contamination surrounding the site, there is potential for contaminants to migrate to the site. As the watercourse intersects the site, it is likely that any nearby contaminants would be able to reach the site.
<i>Metals</i>					Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.
<i>PAHs</i>					
<i>Petroleum hydrocarbons</i>					
<i>VOCs</i>					
<i>PCBs</i>					
<i>Ground gases (methane, carbon dioxide, hydrogen sulphide or carbon monoxide)</i>	Migration of gases into confined spaces/buildings and accumulation (explosion). Inhalation of ground gas (asphyxiation).		Low	Medium	Moderate/low risk
					There are no historical landfills located within 250 m of the site, reducing the potential for ground gas. No coal seams are located within 250 m of the site.

21.11 Summary of mitigation, control measures and recommendations

During construction, standards to mitigate the impact to construction and maintenance workers from contamination, good practice health and safety measures will be implemented including a site-specific risk assessment and the use of personal protective equipment.

The potential risk associated with ground gas generation associated with Made Ground will be mitigated through compliance with confined space legislation during construction. Before construction works start, a health and safety risk assessment will be carried out in accordance with current health and safety regulations.

Dust generation will be kept to a minimum and it is assumed that this will be required to be in compliance with the CoCP and any Nuisance Management Plan, once produced. It is assumed that compliance with the CoCP will also mitigate the potential risk to controlled waters.

To mitigate the impacts to development infrastructure from contamination in soil and groundwater, ground conditions will be assessed and appropriate design of concrete and service pipes to mitigate against aggressive ground conditions will be undertaken.

Given the potential for material to be excavated, soil and/or rock materials arising from construction activities will be sampled, tested and assessed with the aim of re-use either at the originating site or at a suitable receiving site in accordance with CL:AIRE Definition of Waste Development Industry Code of Practice (DOWCOP). It is likely that appropriate re-use criteria will need to be devised to ensure the re-use of material is in line with the DOWCOP suitability for use requirement. Any materials that do not meet the suitable for re-use criteria and that require disposal off-site will be sampled, tested, assessed and characterised in line with BS EN 14899:2005.

If unexpected contamination is identified, further ground investigation to determine its extent (and accompanying risk assessment) will be required. If risk is identified, and remediation strategies are required, the Designer/Contractor shall conduct an Options Appraisal and the relevant Local Authority will be consulted to agree a remedial strategy, and a copy of the remediation strategy and verification reports will be provided to discharge relevant planning conditions. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed.

As the risk to future site users is low, there is no specific mitigation required to reduce the impact to human health for the site.

