

TRANSPENNINE ROUTE

**UPGRADE**



# Transpennine Route Upgrade

**Clayton Bridge Phase 1 Land  
Contamination Desk Study**

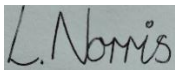
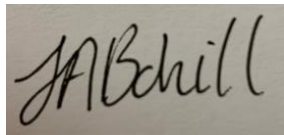
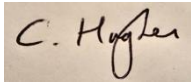
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All references made within this document were considered correct at time of approval.

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## **1. INTRODUCTION**

### **1.1. Scheme Background**

The wider TRU scheme aims to deliver faster more frequent and more reliable services between York and Manchester via Leeds and Huddersfield, and improve connections between key towns and cities across the north of England.

The proposed development is part of a wider scheme of works to improve drainage of the railway line for an approximately 300 m stretch of the line adjacent to the northern boundary of Clayton Vale Country Park (CVCP), to the west of the Clayton Bridge level crossing. This is required to alleviate a saturated track foundation problem and prevent the railway from flooding in this location. Part of these works are within the railway line itself and within Network Rail's (NR) land ownership. As such these works benefit from NR's permitted development rights under Part 8 of the Town and Country Planning (General Permitted Development) (England) Order 2015.

However, part of the site is proposed to be within CVCP, which is in the ownership of Manchester City Council (MCC). Therefore, planning permission is sought for this element.

Atkins Limited (Atkins), has been commissioned by Network Rail to produce a Phase 1 Land Contamination Desk Study in support of planning permission for the proposed development.

### **1.2. Proposed Development**

The proposed development comprises:

- An underground drain that will convey surface water from the railway line into an attenuation tank;
- An underground attenuation tank to receive and temporarily store surface water;
- Two pre-cast concrete catch-pits;
- A further underground drain from the attenuation tank to an outfall/headwall; and
- An outfall/headwall to an existing watercourse, which feeds into the River Medlock.

The proposed development is shown on the General Arrangement Drawing (151667-TSA-17-MVL1-DRG-R-DR-060041) included within Appendix A.

### **1.3. Scope of Works**

This Phase 1 Geo-environmental Desk Study includes the following scope of works:

- Overview of the available information relating to the site including the site setting, topography, geology, mining and quarrying, hydrogeology and hydrology, environmental, and site history;
- Identify geo-environmental risks associated with the proposed development;
- Undertake a preliminary generic qualitative risk assessment and initial Conceptual Site Model (CSM);
- Identify missing information and data gaps;
- Provide information on the geo-environmental constraints of the proposed works; and

- Recommendations for further work / assessment.

## 1.4. Information Sources

The recommendations made in this report are based principally on information contained within the following sources of information:

- Groundsure (GSIP-2022-12587-9697) Data Sheet (Appendix B);
- Groundsure (GSIP-2022-12587-9696) Historical Mapping (Appendix C);
- Current and historical online aerial imagery (1);
- British Geological Survey (BGS) GeoIndex and mapping (2);
- Coal Authority Interactive online map (3);
- UK Radon Interactive online map (4);
- Defras Multi Agency Geographic Information for the Countryside (MAGIC) map viewer (5); and
- Online regional unexploded bomb risk map (6).

It should be noted that the Local Authority has been contacted to obtain further information on private water supplies within the area and on the historical landfill. At the time of issue of this report, no response had been received from the Local Authority. This report shall be updated and re-issued upon receipt of this information.

## 1.5. Limitations

The findings and opinions conveyed in this report are based on third party information obtained from a variety of sources, as detailed within this report, which Atkins believe are reliable. Reasonable endeavours have been made to source information from reputable organisations, but Atkins cannot and do not guarantee the authenticity or reliability of the information. No attempt has been made to independently verify any data collected by others or from other sources.

The accuracy of maps cannot be guaranteed, and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.

Any borehole data from British Geological Survey (BGS) sources are included on the basis that 'The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation'.

This desk study has been based on the current scheme at the time of writing. Should the development proposals change as design develops then a further desk study review may be required.

This assessment has been carried out under current guidance and legislation, if these are revised in the future, then the assessment contained within this report may also need to be updated.

This report does not advise on measures to deal with asbestos. Advice should be sought from an asbestos specialist, as necessary.

Risks / constraints relating to ecology (including invasive plants), flooding, geotechnical, heritage and landscape etc. are beyond the remit of this report.

This desk study was conducted, and this report prepared for use solely by Network Rail. Thereafter, this report shall not be relied upon, or transferred to any other parties without the express written consent of Atkins. If an unauthorised third party comes into possession of this report, they rely on its contents at their own risk.

## 2. SITE CHARACTERISATION

### 2.1. Site Location

The site is located west of Berry Brow Road to the north west of Droylsden. The nearest postcode for the site is M40 1GR. The site is located 80 m north of the River Medlock in the north east corner of Clayton Vale Country Park and the site's northern boundary is located adjacent to the Manchester Victoria and Huddersfield Railway Line. The site is centred on grid reference E388928, N399580 and is shown on the site location plan presented as Drawing 51667-TSA-17-MVL1-DRG-R-DR-060038 within Appendix A.

### 2.2. Site Description

The site is irregular in shape and covers an area of approximately 1,019 m<sup>2</sup> (0.08 hectares). The elevation of the site is approximately 61.5 m to 72 m AOD, sloping towards the south. The site predominantly comprises public open space which is vegetated and a public hardstanding footpath through the centre of the site orientated east to west. The north of the site is located within Network Rail owned land. It should be noted, that no site walkover has been undertaken by an Atkins Contaminated Land Specialist and that descriptions of the site and surrounding area have been based upon online sources of aerial imagery (1).

The site boundary is shown on Drawing 51667-TSA-17-MVL1-DRG-R-DR-060038 within Appendix A.

The site is surrounded by the following current land uses:

- North: Manchester Victoria and Huddersfield Railway Line (adjacent) beyond which are residential properties with gardens (30 m);
- East: Berry Brow Road (adjacent), electricity sub station (adjacent) and residential properties (20 m);
- South: Public open space in the form of Clayton Vale Country Park (adjacent) and the River Medlock (80 m); and
- West: Public open space in the form of Clayton Vale Nature Reserve (adjacent).

### 2.3. Searched Datasets

Data sources obtained from Groundsure Ltd. were searched within the project boundary and within a 250 m buffer of the site boundary. Table 2-1 provides a summary of the result of this search, indicating which features were found within the site area and which features did not intersect the site area.

**Table 2-1 Result of Dataset Search**

| <b>Dataset</b>     | <b>Features found within site and / or within 250 m</b>           | <b>Features searched but not found on-site or within 250 m</b>                                                                                                                                                      |
|--------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sensitive Land Use | Agricultural Land Classification (England), Local Nature Reserves | Areas of Outstanding Natural Beauty, World Heritage Sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI), Designated Ancient Woodland, Conserved |

| <b>Dataset</b>                           | <b>Features found within site and / or within 250 m</b>                                                | <b>Features searched but not found on-site or within 250 m</b>                                                                                                                                                  |
|------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          |                                                                                                        | Wetland Sites (RAMSAR), National Parks, National Nature Reserves (NNR), Nitrate Vulnerable Zones, Nitrate Sensitive Areas, Biosphere Reserves                                                                   |
| Superficial Geology                      | Superficial Geology (1:50,000), Superficial Geology (1:10,000)                                         | -                                                                                                                                                                                                               |
| Landfill and Waste Management Facilities | Historical Landfill (EA and NRW), Waste Exemptions (EA and NRW), Historical Landfill (Local Authority) | Active or Recent Landfill (EA and NRW), Licensed Waste Sites (EA and NRW), Pollution Inventory - Waste Transfer, Historical Landfill (BGS), Historical Waste Sites (planning), Historical Waste Sites (mapping) |
| Mineral Exploitation                     | Underground Workings, Surface Ground Workings, Coal Mining Area                                        | Non Coal Mining Feature, Coal Seams (1:50,000), Coal Seams (1:10,000), British Pits, Historical Mineral Planning Areas                                                                                          |
| Surface Water Bodies                     | Surface Water Body                                                                                     | -                                                                                                                                                                                                               |
| Bedrock Faults                           | -                                                                                                      | Bedrock Faults (1:10,000), Bedrock Faults (1:50,000)                                                                                                                                                            |
| Groundwater Source Protection Zones      | -                                                                                                      | Source Protection Zones (Confined Aquifers), Source Protection Zones                                                                                                                                            |
| Contaminated Land Designations           | -                                                                                                      | Sites Determined as Contaminated Land                                                                                                                                                                           |
| Archaeology                              | Conservation Areas                                                                                     | Scheduled Ancient Monuments EH NRW SNH polygon, Conservation Areas - No Data Areas, Listed Buildings                                                                                                            |
| Ground Stability Hazards                 | Running Sand, Compressible Deposits, Collapsible                                                       | Groundwater Vulnerability Soluble Rock, Landslip 50k, Landslip 10k                                                                                                                                              |

| <b>Dataset</b>                        | <b>Features found within site and / or within 250 m</b>    | <b>Features searched but not found on-site or within 250 m</b>                                                                                                  |
|---------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       | Deposits, Ground Dissolution of Soluble Rocks, Landslides  |                                                                                                                                                                 |
| Planning Hazardous Substance Consents | -                                                          | Regulated Explosive Sites, List 2 Dangerous Substances, List 1 Dangerous Substances, Hazardous Substances Storage, Control of Major Accident Hazards            |
| Recent Industrial Land Uses           | Recent Industrial Land Uses                                | -                                                                                                                                                               |
| Bedrock Geology                       | Bedrock Geology (1:50,000),<br>Bedrock Geology (1:10,000)  | -                                                                                                                                                               |
| Pollution Prevention and Controls     | -                                                          | Pollution Inventory Substances, Licensed Pollutant Release (Part A(2)/B), Licensed Industrial Activities (Part A(1)), Historical Licensed Industrial Activities |
| Pollutant Release to Surface Water    | -                                                          | Pollutant Release to Surface Waters Red List                                                                                                                    |
| WFD Surface Water Bodies              | Rivers and Canals (EA)                                     | Lakes (EA), Coastal and Transitional Water (EA)                                                                                                                 |
| Radioactive Substances                | -                                                          | Radioactive Substance Authorisations, Radioactive Pollution Inventory                                                                                           |
| Pollution Incidents                   | Pollution Incidents                                        | -                                                                                                                                                               |
| Surface Water Discharge Consents      | Licensed Discharges to Controlled Waters                   | -                                                                                                                                                               |
| Groundwater Discharge Consents        | -                                                          | Licensed Discharges to Controlled Waters                                                                                                                        |
| Site History                          | Historical Industrial Land Use, Historical Energy Features | Historic Garages, Historical Military Land, Historical Petrol Stations, Historical Tanks                                                                        |
| Historical Borehole Records           | BGS Boreholes                                              | -                                                                                                                                                               |

| <b>Dataset</b>                  | <b>Features found within site and / or within 250 m</b>                      | <b>Features searched but not found on-site or within 250 m</b>                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Artificial Ground               | Artificial and Made Ground (1:50,000), Artificial and Made Ground (1:10,000) | -                                                                                                                                                                             |
| Superficial Aquifer Designation | Secondary A Superficial Aquifer                                              | Secondary B Superficial Aquifer, Unproductive Superficial Aquifer, Unknown Superficial Aquifer, Secondary Undifferentiated Superficial Aquifer, Principal Superficial Aquifer |
| Radon                           | Radon Affected Areas                                                         | -                                                                                                                                                                             |
| Flood Risk                      | -                                                                            | Flood Defences, Flood Storage Areas, Flood Zone 2, Flood Zone 3, Risk of Flooding from Rivers and the Sea, Areas Benefiting from Flood Defences                               |
| Bedrock Aquifer Designation     | Principal Bedrock Aquifer                                                    | Unproductive Bedrock Aquifer, Secondary Undifferentiated Bedrock Aquifer, Secondary B Bedrock Aquifer, Secondary A Bedrock Aquifer                                            |
| Groundwater Vulnerability       | Groundwater Vulnerability (BGS)                                              | Groundwater Vulnerability (Local Information)                                                                                                                                 |

### 3. SITE HISTORY

#### 3.1. Historical Land Use

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 Groundsure, which are presented in Appendix B and are summarised in Table 3-1.

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 1:1,259 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. In addition, historical aerial imagery has also been viewed (1999-2019).

**Table 3-1 Historical Development**

| <b>Dataset</b>                 | <b>Feature</b>          | <b>Date</b> | <b>Distance (m) from site boundary</b> | <b>Direction (m) from site boundary</b> |
|--------------------------------|-------------------------|-------------|----------------------------------------|-----------------------------------------|
| Historical Industrial Land Use | Refuse Heap             | 1968        | 0 m                                    | NA                                      |
| Historical Industrial Land Use | Unspecified Pit         | 1956        | 0 m                                    | NA                                      |
| Historical Industrial Land Use | Railway Station         | 1891 - 1923 | 0 m                                    | West                                    |
| Historical Industrial Land Use | Unspecified Disused Tip | 1978        | 4 m                                    | South east                              |
| Historical Industrial Land Use | Unspecified Pit         | 1891        | 11 m                                   | North west                              |
| Historical Industrial Land Use | Railway Building        | 1923        | 13 m                                   | North east                              |
| Historical Industrial Land Use | Railway Building        | 1923        | 16 m                                   | North east                              |
| Historical Industrial Land Use | Railway Station         | 1851 - 1956 | 17 m                                   | North east                              |

| <b>Dataset</b>                 | <b>Feature</b>              | <b>Date</b> | <b>Distance (m) from site boundary</b> | <b>Direction (m) from site boundary</b> |
|--------------------------------|-----------------------------|-------------|----------------------------------------|-----------------------------------------|
| Historical Industrial Land Use | Unspecified Heap            | 1985 - 1991 | 21 m                                   | South west                              |
| Historical Industrial Land Use | Railway Station             | 1968        | 23 m                                   | North                                   |
| Historical Industrial Land Use | Unspecified Ground Workings | 1923        | 40 m                                   | North                                   |
| Historical Industrial Land Use | Unspecified Heap            | 1906 - 1938 | 54 m                                   | North east                              |
| Historical Industrial Land Use | Cuttings                    | 1891        | 55 m                                   | West                                    |
| Historical Industrial Land Use | Refuse Heap                 | 1851        | 57 m                                   | South                                   |
| Historical Industrial Land Use | Unspecified Heap            | 1956        | 62 m                                   | North east                              |
| Historical Industrial Land Use | Unspecified Shaft           | 1978        | 64 m                                   | South west                              |
| Historical Industrial Land Use | Cuttings                    | 1921 - 1938 | 66 m                                   | West                                    |
| Historical Industrial Land Use | Unspecified Pit             | 1891        | 69 m                                   | North east                              |
| Historical Industrial Land Use | Unspecified Pit             | 1923        | 81 m                                   | North east                              |
| Historical Industrial Land Use | Unspecified Heap            | 1956        | 98 m                                   | South                                   |

| <b>Dataset</b>                 | <b>Feature</b>                  | <b>Date</b> | <b>Distance (m) from site boundary</b> | <b>Direction (m) from site boundary</b> |
|--------------------------------|---------------------------------|-------------|----------------------------------------|-----------------------------------------|
| Historical Industrial Land Use | Dye Works                       | 1906 - 1933 | 104 m                                  | South west                              |
| Historical Industrial Land Use | Unspecified Pit                 | 1956        | 115 m                                  | North west                              |
| Historical Industrial Land Use | Railway Building                | 1923        | 134 m                                  | East                                    |
| Historical Industrial Land Use | Unspecified Pit                 | 1956        | 146 m                                  | West                                    |
| Historical Industrial Land Use | Smithy                          | 1851        | 153 m                                  | South east                              |
| Historical Energy Features     | Electricity Substation          | 1968 - 1982 | 164 m                                  | South east                              |
| Historical Industrial Land Use | Unspecified Pit/Ground Workings | 1968 - 1978 | 168 m                                  | West                                    |
| Historical Industrial Land Use | Refuse Heap                     | 1968        | 185 m                                  | South west                              |
| Historical Industrial Land Use | Unspecified Mill                | 1956        | 189 m                                  | South east                              |
| Historical Industrial Land Use | Unspecified Ground Workings     | 1906        | 195 m                                  | South west                              |
| Historical Industrial Land Use | Sand Pit                        | 1906 - 1956 | 202 m                                  | West                                    |
| Historical Industrial Land Use | Refuse Heap                     | 1891        | 206 m                                  | West                                    |

| <b>Dataset</b>                 | <b>Feature</b>              | <b>Date</b> | <b>Distance (m) from site boundary</b> | <b>Direction (m) from site boundary</b> |
|--------------------------------|-----------------------------|-------------|----------------------------------------|-----------------------------------------|
| Historical Industrial Land Use | Rubber Works                | 1956 - 1968 | 216 m                                  | North west                              |
| Historical Industrial Land Use | Unspecified Heap            | 1933        | 220 m                                  | East                                    |
| Historical Industrial Land Use | Refuse Heap                 | 1956        | 223 m                                  | North                                   |
| Historical Industrial Land Use | Unspecified Ground Workings | 1938        | 224 m                                  | South east                              |
| Historical Industrial Land Use | Unspecified Quarry          | 1938        | 225 m                                  | East                                    |
| Historical Industrial Land Use | Unspecified Ground Workings | 1923        | 228 m                                  | South west                              |
| Historical Industrial Land Use | Unspecified Pit             | 1991 - 1991 | 229 m                                  | South                                   |
| Historical Industrial Land Use | Unspecified Heap            | 1938        | 236 m                                  | South west                              |
| Historical Industrial Land Use | Unspecified Pit             | 1991        | 242 m                                  | North                                   |
| Historical Industrial Land Use | Unspecified Factory         | 1906        | 243 m                                  | South west                              |
| Historical Energy Features     | Electricity Substation      | 1975 - 1992 | 247 m                                  | North west                              |

## 4. ENVIRONMENTAL SETTING

### 4.1. Published Geology

Information provided by Groundsure and the British Geological Survey (BGS) Geoindex (2) indicates that the following geology is present underlying the site.

#### 4.1.1. Artificial Ground

The 1:10,000 scale published geology maps indicate that the site and surrounding area is underlain by Made Ground (undivided).

#### 4.1.2. Superficial Deposits

Superficial deposits are recorded on site. The 1:10,000 scale published geology maps indicates that there is one superficial geology designation on site and an additional three within 250 m of the site.

A summary of the superficial geology encountered on site and within 250 m of the site boundary is provided in Table 4-1.

**Table 4-1 Superficial Geology Summary**

| <b>Data source (scale)</b>                | <b>Description</b>                | <b>Distance from site boundary</b> | <b>Direction from site boundary</b> | <b>Additional Details</b>   |
|-------------------------------------------|-----------------------------------|------------------------------------|-------------------------------------|-----------------------------|
| Superficial Geology (1:10,000 & 1:50,000) | Till, Devensian                   | 0 m                                | NA                                  | Diamicton                   |
| Superficial Geology (1:10,000 & 1:50,000) | Alluvium                          | 50 m                               | South                               | Clay, Silt, Sand and Gravel |
| Superficial Geology (1:10,000)            | Till, Devensian                   | 152 m                              | South                               | Diamicton                   |
| Superficial Geology (1:10,000 & 1:50,000) | Glaciofluvial Deposits, Devensian | 158 m                              | West                                | Sand and Gravel             |

#### 4.1.3. Bedrock

The 1:10,000 scale published geology indicates that there is one bedrock geology designation on site. There are no others within 250 m of the site. The bedrock underlying the site is the Collyhurst Sandstone Formation, which is described by the BGS as *"A soft red sandstone with abundant beds of "millet seed" sand grains alternating with beds of fine-grained sharp sand"*.

#### 4.1.4. Faults

Bedrock faults are not recorded on site. The 1:10,000 and 1:50,000 scale published geology indicates there are no bedrock faults within 250 m of the site.

## 4.2. Historical Borehole Records

There are no historical borehole records on site. There are a total of 10 BGS boreholes within 250 m of the site. The nearest historical borehole is 157 m, south east of the site boundary. Due to the distance of the historical boreholes from the site, records are unlikely to be representative of ground conditions encountered on site.

## 4.3. Mineral Exploitation

The data from Groundsure records sites of mineral exploitation and other non-coal related activities within 250 m of the site. A summary of the mineral exploitation is provided in Table 4-3.

**Table 4-2 Mineral Exploitation Summary**

| Category                                                 | Summary                                                                                                                        |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Coal seams (derived from 1:10,000 & 1:50,000 scale maps) | There are no coal seams recorded to outcrop at surface or beneath superficial deposits within 250 m of the site.               |
| Coal Mining Areas                                        | The site is located within a coal mining area.                                                                                 |
| Non-Coal Mining Features                                 | There are no non-coal mining features within 250 m of the site.                                                                |
| British Pits                                             | There are no pits within 250 m of the site.                                                                                    |
| Surface Ground Workings                                  | There are two surface ground workings on site (refuse heap and unspecified pit) and an additional 82 within 250 m of the site. |
| Underground Workings                                     | There are no features on site. There is one underground workings within 250 m of the site.                                     |
| Historical Mineral Planning Areas                        | There are no historical mineral planning areas within 250 m of the site.                                                       |

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

**Table 4-3 Mineral Exploitation Sites**

| Category                | Name            | Distance from site | Direction from site | Date / Status |
|-------------------------|-----------------|--------------------|---------------------|---------------|
| Surface Ground Workings | Refuse Heap     | 0 m                | NA                  | 1968          |
| Surface Ground Workings | Unspecified Pit | 0 m                | NA                  | 1956          |

| Category                | Name                        | Distance from site | Direction from site | Date / Status |
|-------------------------|-----------------------------|--------------------|---------------------|---------------|
| Surface Ground Workings | Unspecified Disused Tip     | 4 m                | South east          | 1978          |
| Surface Ground Workings | Unspecified Pit             | 11 m               | North west          | 1891          |
| Surface Ground Workings | Unspecified Heap            | 21 m               | South west          | 1985 - 1991   |
| Surface Ground Workings | Pond/Reservoir              | 25 m               | West                | 1851 - 1956   |
| Surface Ground Workings | Unspecified Ground Workings | 40 m               | North               | 1923          |
| Surface Ground Workings | Unspecified Heap            | 54 m               | North east          | 1096 - 1933   |
| Surface Ground Workings | Cuttings                    | 55 m to 81 m       | West                | 1891 - 1985   |
| Surface Ground Workings | Refuse Heap                 | 57 m               | South               | 1851          |
| Surface Ground Workings | Ponds                       | 60 m               | South west          | 1851          |
| Surface Ground Workings | Unspecified Heap            | 62 m               | North east          | 1956          |
| Underground Workings    | Unspecified Shaft           | 64 m               | South west          | 1978          |
| Surface Ground Workings | Pond                        | 65 m               | South west          | 1891          |
| Surface Ground Workings | Unspecified Pit             | 69 m               | North east          | 1891          |
| Surface Ground Workings | Reservoirs                  | 70 m               | South west          | 1906 - 1938   |
| Surface Ground Workings | Unspecified Pit             | 81 m               | North east          | 1923          |
| Surface Ground Workings | Unspecified Heap            | 98 m               | South               | 1956          |
| Surface Ground Workings | Unspecified Pit             | 115 m              | North west          | 1956          |

| Category                | Name                        | Distance from site | Direction from site | Date / Status |
|-------------------------|-----------------------------|--------------------|---------------------|---------------|
| Surface Ground Workings | Reservoirs                  | 125 m              | West                | 1938          |
| Surface Ground Workings | Unspecified Pit             | 146 m              | West                | 1956          |
| Surface Ground Workings | Unspecified Pit             | 168 m              | West                | 1968 - 1978   |
| Surface Ground Workings | Refuse Heap                 | 185 m              | South west          | 1968          |
| Surface Ground Workings | Unspecified Ground Workings | 195 m              | South west          | 1906          |
| Surface Ground Workings | Sand Pit                    | 203 m              | West                | 1906 - 1956   |
| Surface Ground Workings | Refuse Heap                 | 206 m              | West                | 1891          |
| Surface Ground Workings | Ponds                       | 207 m              | West                | 1851          |
| Surface Ground Workings | Reservoirs                  | 214 m              | West                | 1923 - 1938   |
| Surface Ground Workings | Pond                        | 215 m              | West                | 1906 - 1933   |
| Surface Ground Workings | Unspecified Heap            | 220 m              | East                | 1933          |
| Surface Ground Workings | Refuse Heap                 | 223 m              | North               | 1956          |
| Surface Ground Workings | Unspecified Ground Workings | 224 m              | South east          | 1938          |
| Surface Ground Workings | Unspecified Quarry          | 225 m              | East                | 1938          |
| Surface Ground Workings | Pond                        | 225 m              | East                | 1956          |
| Surface Ground Workings | Unspecified Ground Workings | 228 m              | South west          | 1923          |
| Surface Ground Workings | Unspecified Pit             | 229 m              | South               | 1985 - 1991   |

| Category                | Name             | Distance from site | Direction from site | Date / Status |
|-------------------------|------------------|--------------------|---------------------|---------------|
| Surface Ground Workings | Unspecified Heap | 236 m              | South west          | 1938          |
| Surface Ground Workings | Unspecified Pit  | 242 m              | North               | 1991          |
| Surface Ground Workings | Reservoirs       | 243 m              | North east          | 1891 - 1938   |
| Surface Ground Workings | Ponds            | 246 m              | North east          | 1985 - 1991   |

The Coal Authority viewer (3) indicates the site is within a Coal Mining Reporting Area. However, The Coal Authority viewer indicates the site is not within a Coal Authority high risk area. No past shallow coal mine workings or probable shallow coal mine workings are recorded on site or within 250 m of the site. No mine entry shafts are recorded on site or within 250 m of the site.

#### 4.4. Ground Stability Hazards

The data from Groundsure includes ground stability hazards on or within 250 m of the site which are summarised in Table 4-5.

**Table 4-4 Ground Stability Hazards Summary**

| Hazard                               | Hazard Rating                                            |
|--------------------------------------|----------------------------------------------------------|
| Running Sand                         | Onsite: Very Low<br>Offsite: Low (130 m south east)      |
| Compressible Deposits                | Onsite: Very Low<br>Offsite: Moderate (130 m south east) |
| Collapsible Deposits                 | Onsite: Very Low<br>Offsite: Negligible (50 m south)     |
| Landslides                           | Onsite: Very Low<br>Offsite: Low (185 m north east)      |
| Ground Dissolution (soluble rocks)   | Onsite & Offsite: Negligible                             |
| Landslip (1:10,000 & 1:50,000 scale) | There are no landslip areas within 250 m of the site.    |

## 4.5. Radon

Information from the BGS National Geoscience Information Service provided by Groundsure (Appendix B) indicates that the maximum radon potential on site and within 250 m of the site is 1-3% (estimated percentage of dwellings exceeding the Radon Action Level). The UK Radon Map (4) also indicates that the maximum radon potential of the site is 1 – 3 %. This indicates that no radon protection measures are required in the construction of new dwellings.

## 4.6. Hydrogeology

### 4.6.1. Superficial Deposits

The data from Groundsure indicates the superficial deposits underlying the site have been classified as a Secondary A Aquifer. A Secondary A 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. These are generally aquifers formerly classified as minor aquifers.”*

### 4.6.2. Bedrock

The data from Groundsure indicates the bedrock underlying the site has been classified as a Principal Aquifer. A Principal Aquifer is described by the Environment Agency as *“Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.”*

### 4.6.3. Groundwater Vulnerability

The Groundsure report records the groundwater underlying the site has a low vulnerability to a pollutant discharge classification indicating that the site is located within an area that provides the greatest protection from pollution. This is characterised *“by low leaching soils and/or the presence of superficial deposits characterised by a low permeability”*.

### 4.6.4. Groundwater Source Protection Zones

The data from Groundsure and MAGIC website (5) both indicate the site is not within a Groundwater Source Protection Zone.

### 4.6.5. Groundwater Abstractions

The data from Groundsure indicates there is one groundwater abstraction licence within 250 m of the site. The abstraction is located 157 m south east of the site, extracting water for general use and is operated by Manchester Abattoir. The status of the abstraction is listed as historical. No further abstractions are located within 250 m of the site.

### 4.6.6. Groundwater Discharge Consents

The data from Groundsure indicates there are no licensed discharges to groundwater features within 250 m of the site.

## 4.7. Hydrology

### 4.7.1. Surface Watercourses

The nearest surface water feature is recorded by Groundsure as an “unnamed inland river” and is located 1 m south of the site. The classification of the nearest watercourse to the site as an “inland river” is thought to be inaccurate, with the watercourse likely to be smaller in size and capacity than that of a river. A summary of surface water courses (e.g. rivers, lakes, canals) within 250 m of the site has been provided in Table 4-6.

**Table 4-5 Surface Water Features Summary**

| Dataset                      | Name of Watercourse            | Type         | Distance from Site | Direction from Site | WFD Overall Classification |
|------------------------------|--------------------------------|--------------|--------------------|---------------------|----------------------------|
| Water Network (OS MasterMap) | Unnamed                        | Inland River | 1 m                | South               | n/a                        |
| Water Network (OS MasterMap) | Medlock (Lumb Brook To Irwell) | River        | 80 m               | South               | Moderate                   |
| Water Network (OS MasterMap) | Unnamed                        | Inland River | 249 m              | North               | n/a                        |

### 4.7.2. Surface Water Discharge Consents

The data from Groundsure indicates there are no discharge consents on site. There is a total of 14 licensed discharges to surface water features within 250 m of the site. In addition, there are no pollutant release 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 4-7.

**Table 4-6 Surface Water Discharge Consents**

| Dataset                                  | Permit Number | Receiving Water    | Effluent Type                                             | Distance from Site | Direction from Site | Effective Date                          |
|------------------------------------------|---------------|--------------------|-----------------------------------------------------------|--------------------|---------------------|-----------------------------------------|
| Licensed Discharges to Controlled Waters | 01Man0108     | Berry Brow Culvert | Sewage discharges – sewer storm overflow – water company. | 45 m               | South east          | 01/01/1995<br><br>Revoked<br>04/02/2016 |
| Licensed Discharges to Controlled Waters | 01Man0104     | Berry Brow Culvert | Sewage discharges – sewer storm overflow –                | 55 m               | South East          | 01/01/1995<br><br>Revoked<br>04/02/2016 |

| Dataset                                  | Permit Number | Receiving Water    | Effluent Type                                                  | Distance from Site | Direction from Site | Effective Date                          |
|------------------------------------------|---------------|--------------------|----------------------------------------------------------------|--------------------|---------------------|-----------------------------------------|
|                                          |               |                    | water company.                                                 |                    |                     |                                         |
| Licensed Discharges to Controlled Waters | 01Man0108     | Berry Brow Culvert | Sewage discharges – sewer storm overflow – water company.      | 82 m               | North East          | 05/02/2016 – Effective                  |
| Licensed Discharges to Controlled Waters | 016991051     | River Medlock      | Sewage Discharges – final/treated effluent – not water company | 162 m              | South East          | 23/10/1985<br><br>Revoked<br>06/10/1992 |
| Licensed Discharges to Controlled Waters | 016983274     | River Medlock      | Sewage discharges – sewer storm overflow – water company.      | 192 m              | South East          | 07/02/2020 – Effective                  |
| Licensed Discharges to Controlled Waters | 01Tam0004     | -                  | Sewage discharges – sewer storm overflow – water company.      | 195 m              | South East          | 01/04/1991 – Effective                  |
| Licensed Discharges to Controlled Waters | 01Man0131     | River Medlock      | Sewage discharges – sewer storm overflow – water company.      | 196 m              | South East          | 01/01/1995<br><br>Revoked<br>12/09/1999 |
| Licensed Discharges to Controlled Waters | 016983274     | River Medlock      | Sewage discharges – sewer storm overflow – water company.      | 211 m              | South East          | 31/08/1999<br><br>Revoked<br>06/02/2020 |
| Licensed Discharges                      | 01Man0104     | Berry Brow Culvert | Sewage discharges – sewer storm                                | 220 m              | North               | 05/02/2016 – Effective                  |

| Dataset              | Permit Number | Receiving Water | Effluent Type             | Distance from Site | Direction from Site | Effective Date |
|----------------------|---------------|-----------------|---------------------------|--------------------|---------------------|----------------|
| to Controlled Waters |               |                 | overflow – water company. |                    |                     |                |

#### 4.7.3. Surface Water Abstraction Licences

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

#### 4.7.4. Flood Risk

The data from Groundsure indicates the site and land within 50 m of the site boundary is not at risk of flooding from rivers and seas. A medium risk of flooding from rivers and the sea is located 60 m south of the site, associated with the River Medlock.

The Groundsure Report indicates that the highest risk of surface water flooding to occur on site is indicated to be 1 in 100 year, 0.1 to 0.30 m. It is also indicated that the site is within an area of moderate potential for groundwater flooding.

The following Flood Risk datasets included within the Groundsure Report were assessed, but none of the following features were found to exist on site or within the 250 m buffer area: flood defence, flood storage area, flood zone 2 area, flood zone 3 area, risk of flooding from rivers and sea, area benefiting from flood defences.

## 5. ENVIRONMENTAL RECORDS

### 5.1. Historical and Current Landfills and Waste Management Facilities

The data from Groundsure records four landfills / waste management facilities within 250 m of the site. A summary of historical and current landfills and waste sites has been provided in Table 5-1.

**Table 5-1 Landfill and Waste Summary**

| Category                         | Site Name or Address                                     | Description of Waste                                                                                 | Distance from site | Direction from site | Input Dates              |
|----------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------|---------------------|--------------------------|
| Historical Landfill (EA and NRW) | Clayton Vale Power Station, Bank Bridge Road, Manchester | Inert, Industrial, Commercial, Household, Special, Liquid sludge                                     | 0 m                | NA                  | 31/12/1965 to 31/12/1968 |
| Historical Landfill (EA and NRW) | Graver Lane, Newton Heath, Greater Manchester            | -                                                                                                    | 82 m               | North east          | None                     |
| Historical Landfill (EA and NRW) | Ash Road, Greater Manchester                             | Inert, Industrial, Commercial, Household, Special, Liquid sludge                                     | 192 m              | South east          | 31/12/1935 to 31/12/1978 |
| Waste Exemptions (EA and NRW)    | -                                                        | Storage of waste in a secure place. Screening and blending of waste and Use of waste in construction | 242 m              | East                | None                     |

### 5.2. Pollution Incidents

There is one pollution incident reported by Groundsure within 250 m of the site and a summary has been provided in Table 5-2.

Table 5-2 Pollution Incidents

| Type         | Distance from site | Direction from site | Category of Incident: Air | Category of Incident: Land | Category of Incident: Water | Date of Incident |
|--------------|--------------------|---------------------|---------------------------|----------------------------|-----------------------------|------------------|
| Storm Sewage | 199 m              | South east          | Category 4 (No Impact)    | Category 4 (No Impact)     | Category 3 (Minor)          | 12/07/2001       |

### 5.3. Pollution Prevention and Control

The data from Groundsure indicates there are no Local Authority Pollution Prevention and Controls (LAPPC) applications, no Control of Major Accident Hazards (COMAH) Sites / planning hazardous substance consents or no radioactive substance authorisation features within 250 m of the site.

### 5.4. Recent Industrial Land Uses

The data from Groundsure indicates there are no features on site. There is one recent industrial land use within 250 m of the site, relating to an Electricity Sub Station, located 167 m south east of the site.

### 5.5. Active and Current Petrol Stations

Groundsure data indicates there are no fuel stations recorded within 250 m of the site.

### 5.6. Contaminated Land Designations

According to Groundsure there are no Contaminated Land Designations within 250 m of the site.

### 5.7. Sensitive Land Uses

The data from Groundsure indicates the site is located within the Clayton Vale Local Nature Reserve (LNR). No further sensitive land uses have been identified within 250 m of the site.

### 5.8. Archaeology

The data from Groundsure indicates there is a conservation area, Graver Lane, Newton Heath, located 14 m north of the site. MAGIC (5) did not identify any further visual and/or cultural designations within 250 m of the site.

### 5.9. Unexploded Ordnance

According to freely available online risk maps (6), there is a moderate risk of unexploded bombs (UXB) on the site.

## 6. INITIAL CONCEPTUAL SITE MODEL AND CLASSIFICATION OF RISK

### 6.1. Introduction

This report has been prepared to assist in the identification of potential constraints that contamination might pose to the development site and to provide a preliminary risk assessment to inform the design of the proposed development. The assessment methodology used is similar to that derived for the determination of statutory Contaminated Land, as defined in Part 2A of the Environmental Protection Act 1990(7) which is assessed through the identification and assessment of contaminant linkages (Source-Pathway-Receptor relationships). Implicit in the Defra Contaminated Land Statutory Guidance 2012 (7) is the application of risk assessment to consider whether potential contaminant linkages may be significant. In accordance with guidance provided in Land Contamination: Risk Management (LR:CM) (8) as published by the Environment Agency, human health, buildings and wider environmental receptors and pathways have been identified based on the proposed end-use. This approach has been accepted by devolved administrations across the UK.

Primary guidance for assessing and managing land contamination is presented in LR:CM (8). This provides a technical framework for identifying and remediating contamination through the application of a risk management process. The question of whether risk is unacceptable in any particular case involves not only scientific and technical assessments, but also appropriate criteria by which to judge the risk and conclude exactly what risk would be unacceptable.

An Initial conceptual site model (CSM) has been developed based on the available information, to enable the assessment of the potential land contamination risks. An Initial CSM describes the relationship between potential sources of contamination (resulting from both on- and off-site historical and current activities) and receptors to the potential contamination. As part of the Initial CSM development, three elements are identified and assessed:

- Source of contamination and associated contaminants;
- Receptors to that contamination – human beings, controlled waters (surface water/groundwater), ecological systems and property/services; and
- Pathways between the sources and receptors.

Where all three elements are present or are likely to be present, they are described as potential contaminant linkages (PCLs), which can then be subjected to the risk assessment and risk management process.

The preliminary risk categorisations presented are based on an assessment of the potential consequence of each PCL occurring along with the likelihood that each PCL will occur. Potential contaminants that might be present have been identified through knowledge of historical and recent land uses on or within 250 m of the site.

### 6.2. Initial Conceptual Site Model

Through a review of available historical and published information (e.g. historical maps, environmental records, etc.), 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 contaminants, 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 potential future uses of the site for underground drainage/attenuation tanks.

#### 6.2.1. 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. It should be noted that the proposed discharge from the new tanks/drainage has been discounted as a source of potential contamination. It is assumed that the risks posed by the discharge to surface water will be assessed separately during design and as part of the application for the new discharge permit.

- On-site:
  - Made Ground associated with historical uses of the site;
  - Refuse heap/historical landfill;
  - Infilled ground;
  - Railway station.
- Off-site:
  - Made Ground associated with off-site land uses;
  - Historical railway activities;
  - Unspecified disused tips and refuse heaps;
  - Dye works;
  - Unspecified pits, ground workings, heaps;
  - Railway buildings;
  - Cuttings;
  - Smithy;
  - Unspecified mill;
  - Rubber Works;
  - Unspecified factory;
  - Electricity sub station;
  - Discharge consents to surface waters;
  - Landfills and waste exemptions; and
  - Pollution incidents.

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);
- Polychlorinated biphenyls (PCBs); and

- Ground gases (radon, carbon dioxide, carbon monoxide, methane and hydrogen sulphide).

### 6.2.2. Potential Receptors

The following receptors have been identified at the site based on end uses including underground drainage, railway/Network Rail owned land and public open space:

- Human Health:
  - On-Site – Maintenance workers of the drainage system, railway workers and members of the public utilising the public footpath and park / Nature Reserve; and
  - Off-Site – Users of the park / Nature Reserve, railway workers, maintenance workers for the electricity sub station and residents.
- Controlled Waters:
  - Groundwater – Secondary A Superficial Aquifer, Principal Bedrock Aquifer and Groundwater Abstraction (157 m south east);
  - Surface Water – Unnamed watercourse, which discharges into the River Medlock.
- Property and Services:
  - On-site – new infrastructure associated with the drainage system and railway infrastructure located within Network Rail land.
  - Off-site – commercial services and residential properties.
- Environment and Ecology:
  - Clayton Vale Local Nature Reserve

It should be noted that under current health and safety legislation, employers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect their workers, 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) Regulations (9) 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 health and safety best practices and personal protective equipment (PPE) will be adopted during the construction works and acute risks to construction and maintenance workers have therefore not been considered as part of this assessment.

Also, as a landfill underlies the majority of Clayton Vale Country Park, it is assumed that the council's workforce/volunteers who maintain the park are aware of any associated risks and that Risk Assessments are in place for all digging activities (vegetation planting, fence posts, etc).

### 6.2.3. Potential Pathways

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

- Human Health
  - Ingestion of contaminated soils, soil-derived dust and groundwater;
  - Inhalation of soil and soil-derived dust, ground gases, and soil and groundwater derived vapours;
  - Dermal contact with soil, soil derived dust and groundwater; and

- Inhalation of organic vapours (e.g. from hydrocarbons that might be in landfill waste) 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, superficial deposits and bedrock (e.g. sandstone and/or highly fractured rock);
  - Migration of groundwater to the adjacent stream and the River Medlock;
  - Migration via preferential pathways e.g. new services and future foundations; and
  - Surface water run-off.
- Property:
  - Ground gas migration and build up within confined spaces; and
  - Direct contact of services with soil and/or groundwater.
- Environment and Ecology
  - Contact/absorption of contaminants by flora/fauna in Clayton Vale Local Nature Reserve.

### 6.3. Qualitative Risk Assessment

Table 6-1 below provides the qualitative risk matrix, based on CIRIA guidance (10), in which the likelihood or probability of each contaminant linkage being realised is ranked against the severity of the consequences. The result is the relative risk classification, the results of which can inform the due diligence process and allow prioritisation of any further assessments or the implementation of risk management measures.

**Table 6-1 Qualitative Risk Matrix**

| Risk Matrix                        |                 | Severity of Consequence |                   |                   |                   |
|------------------------------------|-----------------|-------------------------|-------------------|-------------------|-------------------|
|                                    |                 | Severe                  | Medium            | Mild              | Minor             |
| Probability of Contaminant linkage | High Likelihood | Very High Risk          | High Risk         | Moderate Risk     | Moderate/Low Risk |
|                                    | Likely          | High Risk               | Moderate Risk     | Moderate/Low Risk | Low Risk          |
|                                    | Low Likelihood  | Moderate Risk           | Moderate/Low Risk | Low Risk          | Very Low Risk     |
|                                    | Unlikely        | Moderate/Low Risk       | Low Risk          | Very Low Risk     | Very Low Risk     |

Definitions of the risk classifications presented in the guidance are given in Table 6-2 below.

**Table 6-2 Risk Classifications**

| <b>Risk Classification</b> | <b>Definition</b>                                                                                                                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very High Risk             | There is a high probability that severe harm could arise to a designated receptor from an identified source, or there is evidence that severe harm to a designated receptor is currently happening.                                                    |
| High Risk                  | Harm is likely to arise to a designated receptor from an identified source.                                                                                                                                                                            |
| Moderate Risk              | It is possible that harm could arise to a designated receptor from an identified source. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. |
| Low Risk                   | It is possible that harm could arise to a designated receptor from an identified source, but it is likely that this harm, if realised, would at worst normally be mild.                                                                                |
| Very Low Risk              | There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.                                                                                                                |

The PCLs identified in previous sections are judged against this risk matrix and professional judgement has been used to estimate the combination of probability of a contaminant linkage being realised and the consequence of the harm that might result in line with CIRIA C552 (10). Details of the potential contaminant linkages and associated risks are recorded in Table 6-3.

Table 6-3 Initial Conceptual Site Model and Risk Assessment

| 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> <ul style="list-style-type: none"> <li>• Made Ground associated with historical uses of the site;</li> <li>• Refuse heap/historical landfill;</li> <li>• Infilled ground;</li> <li>• Railway station;</li> <li>• Radon.</li> </ul> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>Ammonia</i></p> <p><i>Cyanide</i></p> <p><i>Sulphate</i></p> <p><i>Polycyclic aromatic hydrocarbons (PAHs)</i></p> <p><i>Petroleum hydrocarbons</i></p> <p><i>Volatile organic compounds (VOCs) &amp; Semi-volatile organic compounds (SVOCs)</i></p> <p><i>Ground gases (methane, carbon dioxide, hydrogen sulphide and carbon monoxide)</i></p> | Inhalation, ingestion and dermal contact with contaminants in soil and soil derived dust.                                                                            | <p><u>Human Health</u> –</p> <p>On-site: Members of the public, Network Rail workers</p> <p>Off-site: Members of the public, railway workers and residents</p>                                                                                                                                                                                    | Unlikely       | Medium      | <p><b>Low Risk</b></p> <p>Based on the historical use of the site, it is possible that contamination may be present in the soils.</p> <p>Following completion of the new drainage system and attenuation tank the footpath will be reinstated and sufficient thickness of top/subsoil replaced/imported (subject to meeting re-use/import criteria) to promote vegetation growth. The topsoil/vegetation and hardstanding will restrict public exposure to the underlying Made Ground. It is also assumed that topsoil and/or gravel will be replaced at surface within Network Rail land. Therefore, landfill material underlying the site is unlikely to pose an unacceptable risk to the public or Network Rail employees.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Inhalation of asbestos fibres.                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                   | Unlikely       | Severe      | <p><b>Low/Moderate Risk</b></p> <p>Due to the anticipated presence of landfill materials on site there is the potential for asbestos to be present. The site will be covered in hardstanding or top/subsoil and vegetation which will limit exposure to the underlying Made Ground.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p> <p>Inhalation of vapours.</p> | <p><u>Human Health</u> –</p> <p>On-site: members of the public and Network Rail workers</p> <p>Off-site: Members of the public, railway workers and residents</p> <p><u>Property</u> –</p> <p>On-site: Infrastructure associated with new drainage and railway infrastructure</p> <p>Off-site: commercial services and residential properties</p> | Low likelihood | Severe      | <p><b>Moderate Risk</b></p> <p>As no new buildings are proposed on site and exposure times are likely to be low (users of public footpath/park), it is unlikely that ground gas/vapours will pose an unacceptable risk as they would disperse into the atmosphere. No buildings are located within Network Rail land in the north of the site, with the workforce undertaking the majority of their work outdoors. Gas/vapours are likely to disperse into the atmosphere.</p> <p>Potential sources of ground gas have been identified based on desk study information, including the presence of a landfill on site. The degree of risk posed by the landfill will be dependent on the type of material present. The landfill is recorded to have been licensed to accept inert, industrial, commercial, household, special and liquid sludge waste and is noted to have stopped accepting waste in 1968, indicating that over 50 years have passed since infilling stopped. Gas production of inert waste is minimal and any gas generation is likely to have declined over time. However, the presence of an attenuation tank on site may create an enclosed space (particularly when empty) which may result in ground gas build up and explosion if methane is present. Gas risk will need to be considered as part of the design of the proposed works.</p> <p>The nearest residential properties are located 20 m east of the site. However, the proposed works are unlikely to create new gas migration pathways to off-site receptors and the current gas regime is unlikely to be altered.</p> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Direct contact of foundations/services with aggressive soils and or groundwater.</p> <p>Chemical attack to buried structures.</p>                                 |                                                                                                                                                                                                                                                                                                                                                   | Likely         | Medium      | <p><b>Moderate Risk</b></p> <p>Due to the likelihood of landfill material being present on site there is the potential for aggressive ground conditions in relation to buried structures (e.g. sulphate concentrations might affect the type of concrete used for the development and plastics utilised within pipes and the attenuation tank). Materials that are chemically resistant may need to be utilised and this should be assessed during design.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Sources                                                                                                                                                                                                                                                                                                                                                                                                            | Pathway                                                                                                                                                                                                                                                                                                  | Receptor                                                                                                                                                   | Probability    | Consequence | Classification of Risk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                    | Leaching or dissolution of contaminants in unsaturated soils and subsequent migration<br><br>Lateral and vertical migration through Made Ground, superficial deposits and bedrock.<br><br>Migration via preferential pathways e.g. proposed service pipes/trenches, piled foundations.                   | <u>Groundwater Controlled Waters</u> – Secondary A Superficial Aquifer and Principal Bedrock Aquifer. Groundwater Abstraction (157 m south east).          | Likely         | Medium      | <b>Moderate Risk</b><br><br>If significant Made Ground/landfill material is present, there is potential for leaching of contaminants into groundwater in the superficial deposits and bedrock. However, at present the thickness/composition of Made Ground and superficial deposits underlying the site is currently unknown. It is likely that the proposed works are to take place within the Made Ground and/or superficial deposits, with the construction of the attenuation tank requiring the removal of landfill material from site. The presence of heterogeneous Glacial Till underlying the site means that granular layers could be present (which might provide a preferential contaminant migration pathway to, for example, the river).<br><br>The works undertaken are unlikely to impact upon bedrock underlying the site, with works unlikely to create a pathway to the underlying Principal Aquifer.                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                    | Leaching or dissolution of contaminants in unsaturated soils and subsequent migration<br><br>Lateral and vertical migration through Made Ground, superficial deposits and bedrock<br><br>Surface water run off.<br><br>Migration of contaminated water in drainage ditches to controlled surface waters. | <u>Surface Water Controlled Waters</u> – adjacent stream and the River Medlock                                                                             | Likely         | Medium      | <b>Moderate Risk</b><br><br>The nearest surface water feature is an unnamed watercourse, currently located adjacent to the southern site boundary. If significant Made Ground or contamination is present, there is a potential risk to surface water as the works may introduce a pathway for contaminants for example along new pipe trench backfill. Ground disturbance during construction is likely to increase leaching, however, this will only be temporary. Works are likely to result in the removal of material from site, primarily landfill material/Made Ground, for the construction of the attenuation tank and pipework. This will result in the reduction of source material on site, therefore reducing the impact upon controlled waters.<br><br>The development itself is designed to funnel excess water off the surrounding area to a tributary of the River Medlock, therefore managed water flow to the receptors is a key consideration in the development design. |
|                                                                                                                                                                                                                                                                                                                                                                                                                    | Contact/absorption of contaminants by flora/fauna in Huddersfield Broad Canal LWS.                                                                                                                                                                                                                       | <u>Environment and Ecology</u> - Clayton Vale Local Nature Reserve                                                                                         | Unlikely       | Medium      | <b>Low Risk</b><br><br>The site is located within the Clayton Vale Nature Reserve which is underlain by a landfill. It is unlikely that the works undertaken at the site are going to introduce new pathways for contaminant migration as the wider Nature Reserve is underlain by the landfill.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Potential contaminants in soil/groundwater on-site, originating from the following <u>off-site</u> sources:<br><br><ul style="list-style-type: none"> <li>• Made Ground associated with off-site land uses;</li> <li>• Historical railway activities;</li> <li>• Unspecified disused tips and refuse heaps;</li> <li>• Dyeing and finishing works;</li> <li>• Unspecified pits, ground workings, heaps;</li> </ul> | Inhalation, ingestion and dermal contact with contaminants in soil derived dust.                                                                                                                                                                                                                         | <u>Human Health</u> –<br><br>On-site: members of the public and Network Rail workers<br><br>Off-site: Members of the public, railway workers and residents | Unlikely       | Medium      | <b>Low Risk</b><br><br>The majority of the surrounding area is currently either covered in residential properties, hardstanding or vegetation, which would limit exposure to underlying soils and thus dust generation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                    | Leaching of contaminants from soil and migration to groundwater, followed by                                                                                                                                                                                                                             | <u>Groundwater Controlled Waters</u> - Secondary A Superficial Aquifer and                                                                                 | Low Likelihood | Medium      | <b>Moderate/Low Risk</b><br><br>Groundwater is likely to flow to the south towards the River Medlock, so there is a possibility that contaminants from the north of the site might be transported beneath the site by groundwater. Till is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Pathway                                                                                                                                | Receptor                                                                                                                                                                                                                                                                                                                                                       | Probability    | Consequence | Classification of Risk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Railway buildings;</li> <li>• Railway station;</li> <li>• Smithy;</li> <li>• Unspecified mill;</li> <li>• Rubber Works;</li> <li>• Unspecified factory;</li> <li>• Electricity sub station;</li> <li>• Discharge consents to surface waters;</li> <li>• Landfills and waste exemptions; and</li> <li>• Pollution incidents.</li> </ul> <p>Possible contaminants include:</p> <p><i>Asbestos</i></p> <p><i>Metals</i></p> <p><i>PAHs</i></p> <p><i>Petroleum hydrocarbons</i></p> <p><i>VOCs</i></p> <p><i>PCBs</i></p> <p><i>Ground gases (radon, methane, carbon dioxide, hydrogen sulphide and carbon monoxide)</i></p> | lateral migration beneath the site.                                                                                                    | Principal Bedrock Aquifer.                                                                                                                                                                                                                                                                                                                                     |                |             | <p>heterogeneous and can be highly variable in composition, therefore it is possible that groundwater may flow through granular layers under the site towards the River Medlock.</p> <p>Sources of contamination are present to the north of the site (upgradient) include historical railway activities/features (15 m), unspecified heaps (20 m) and pits (10 m) and a rubber works (215 m). The main sources of off-site contamination which pose a risk to controlled waters are the historical features associated with the railway to the north. The degree of risk posed by this PCL will be dependent on degree of contamination already present within groundwater flowing beneath the site, the geology encountered, the depth to groundwater and whether the proposed works are likely to intercept groundwater.</p>                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>Migration of gases into confined spaces/buildings and accumulation (explosion).</p> <p>Inhalation of ground gas (asphyxiation).</p> | <p><u>Human Health</u> –</p> <p>On-site: members of the public and Network Rail workers</p> <p>Off-site: Members of the public, railway workers and residents</p> <p><u>Property and Services</u></p> <p>– On-site: infrastructure associated with new drainage and railway infrastructure</p> <p>Off-site: commercial services and residential properties</p> | Low Likelihood | Severe      | <p><b>Moderate Risk</b></p> <p>The main source of gas/vapours is the landfill which extends off site to the south and west. However, due to the age of input ceasing (1968) and the material accepted by the landfill (inert , industrial, commercial, household, special and liquid sludge waste), landfill gas is unlikely to be produced at significant enough levels to pose an unacceptable risk.</p> <p>The remaining potential off-site sources of ground gas are located more than 100 m from the site and are therefore unlikely to produce sufficient gas volumes to migrate over such a distance.</p> <p>Due to the lack of buildings on site and short exposure times, ground gas/vapours are unlikely to pose an unacceptable risk to human health.</p> <p>However, the creation of enclosed spaces, within the attenuation tank, could result in a build-up of ground gas and possible explosion. The proposed design should consider the risk of creating new potential gas migration pathways.</p> |

## 7. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the development comprising underground drains, attenuation tank, catch pits and outfall/headwall. If the development varies from the description outlined in Section 1.2 and shown on the General Arrangement Drawing (151667-TSA-17-MVL1-DRG-R-DR-060041), the risk assessment and CSM presented within this report may need to be revised.

### 7.1. Conclusions

This section and the CSM in Section 6 comprise the decision record for this stage of the land contamination risk assessment.

Review of published geological mapping indicates the site is likely to be underlain by the following:

- Made Ground including landfill material;
- Glacial Till; and
- Sandstone of the Collyhurst Sandstone Formation.

Historical/current sources of contamination on site and within 250 m of the site boundary include: the majority of the landfill, electricity sub station, dye works, historical railway activities, ground workings/heaps, smithy, mill, rubber works, discharge consents, waste exemptions and pollution incidents.

An Initial CSM has been produced to assess the potential risks to site users, property, controlled water and ecological receptors that might result from the Proposed Development. Based on a review of the information currently available and the qualitative risk assessment included within the CSM, three of the PCLs were considered Low risk, two Moderate/Low risk and five classified as Moderate risk.

The PCLs identified as representing Moderate risks are associated with the risk from ground gas from onsite and offsite sources, the risk to controlled waters from contamination sources onsite and the risk of aggressive ground conditions impacting the Proposed Development. Given the overall sensitivity of development is low (below ground infrastructure, no new buildings proposed) it is anticipated that these risks can be easily mitigated through appropriate design following ground investigation and further risk assessment.

### 7.2. Recommendations

PCLs have been identified that require more information to proceed to the next stage of risk assessment (generic quantitative risk assessment – GQRA). A ground investigation is currently underway to collect data on the underlying geology, chemical composition of Made Ground and groundwater on site and to investigate the gas regime.

The ground investigation will aim to:

- establish the content and thickness of the suspected landfill material at the site;
- collect samples for geoenvironmental testing from areas where material is likely to be dug up;
- obtain data on the gas regime onsite e.g gas concentrations, flow rates;

- collect data to inform if material can be reused on-site and/or inform waste characterisation; and
- collect groundwater samples if encountered and schedule for environmental testing to inform existing groundwater quality.

The findings of the ground investigation will allow further quantitative risk assessment to determine if unacceptable risks from contamination remain. Remediation works or mitigation through appropriate design of the infrastructure to be constructed on site will be recommended, if required, to address any unacceptable risks identified. For example, if a risk from hazardous gas to the Proposed Development remains following gas monitoring and GQRA, design of the infrastructure would need to take this into account and ensure the potential for gas accumulation was reduced as far as is reasonably practicable.

## APPENDIX A – DRAWINGS/FIGURES

## APPENDIX B – GROUNDSURE DATA SHEET

## APPENDIX C – GROUNDSURE HISTORICAL MAPPING

