Network Rail (Huddersfield to Westtown Dewsbury) Improvements) Order

Condition 10: Contaminated Land Stage 4

Remediation Statement - Huddersfield Station

Document Ref: 151667-TSA-00-TRU-REP-W-EN-0012432

Network Rail

October 2023

Contents

Tables

1. INTRODUCTION

1.1 General

1.1.1 The Transpennine Route Upgrade Programme (TRU) will increase local network capacity, improve reliability, and reduce journey times on the route between Manchester Victoria and York via Huddersfield and Leeds. These benefits are realised through a series of discrete geographical interventions forming discrete Projects. The TRU West works between Huddersfield Viaduct and Westtown (Dewsbury) are described as Project W3.

1.1.2 A Transport and Works Act Order (TWAO) for the Huddersfield and Westtown (Dewsbury) section of the TRU was submitted to the Secretary of State for Transport on 31 March 2021 (The Network Rail Huddersfield to Westtown (Dewsbury) Improvements Order). Upgrading the railway between Huddersfield and Westtown (Dewsbury) is key to delivering passenger benefits along the Transpennine railway.

1.1.3 This report is focused on the proposed improved works at Huddersfield Station, which includes the remodelling of the station. The site is located at Huddersfield Station, St George Square, Huddersfield, centred on 414341E, 416900N between TRU chainages A:41290 and A:41660.

1.1.4 The improvement works are shown in drawing 151667-TSA-30-MVL3-DRG-T-LP-166002 in Appendix A, and are proposed to comprise:

- Current smaller train shed (Roofs B and C) to be demolished.
- New roof to be constructed to cover platforms to north;
- Free standing canopies to be constructed over island platforms to eastern end of station;
- Installation of Overhead Line Electrification (OLE) equipment, supported by piled foundations;
- Existing tea rooms to be retained but relocated within island platform. Timber structure to be dismantled and reconstructed;
- Additional access and egress through the station and platforms is required.
- A covered footbridge (with lifts and associated motor rooms) is to be constructed to the eastern end of the station, supported by piled foundations;
- Track modifications;
- New station canopy is proposed, assumed to be supported by piled foundations;
- Extension to existing subway MVL3/91 (of 12.5m) required to service the new island platform to the north of the station, with an additional lift; and
- A new drainage system and an attenuation water tank (tank to be constructed in Network Rail Maintainer's Yard).

1.2 Objectives

1.2.1 The land contamination risk assessment presented in the Huddersfield Station Phase 2 Land Contamination Risk Assessment Report (Network Rail, 2023) concluded that:

- There were no unacceptable risks to human health or controlled waters receptors from soils or groundwater.
- It was identified that the majority of soils could be re-used on site (subject to reuse complying with requirements of a materials management plan (MMP) or environmental permit) and that the risks posed to the underlying bedrock aquifer should be considered during piling design through completion of a piling risk assessment, which was undertaken in June 2023 (Network Rail, 2023).

- A potential for hazardous gas generation has been identified onsite, which may accumulate in confined spaces such as the attenuation tank, lift shafts/pits, motor rooms and subway. Additionally, if dewatering was to be needed, degassing of the shallow workings may occur.

1.2.2 This report presents the remediation statement that details the activities that should be undertaken prior/during construction, including:

- Sampling/testing strategy for soils to verify re-use of site-won materials and imported soils;
- Gas protection measures;
- Procedure to follow if unexpected ground conditions are encountered;
- Decommissioning of monitoring wells; and
- A verification plan.

1.3 Information Sources

1.3.1 Information has been obtained from the following sources:

- Network Rail, Environment Statement Volume 2ii: Huddersfield, 2019 (Network Rail, 2019)
- Huddersfield Station, Phase 2 Land Contamination Risk Assessment, 2022 (Network Rail, 2023).
- Network Rail, Huddersfield Station, Piling Risk Assessment (Network Rail, 2023)

1.4 Limitations

1.4.1 The report authors are responsible for selecting and summarising the data supplied by the Client or other parties but cannot be held responsible for any mistakes or inaccuracies or the completeness of third-party data on which it has relied.

1.4.2 As with any point data, ground conditions can only be inferred between test locations and as such localised conditions on site may vary between point locations and groundwater/ground gas conditions may differ from those encountered during the monitoring periods.

1.4.3 This report does not advise on measures to deal with asbestos. Detailed advice will be obtained from an asbestos specialist by the construction contractor.

1.4.4 This report should be read considering the legislation, statutory requirements and/or industry good practice applicable at the time of the report being written. Any subsequent changes in this legislation, guidance or design may necessitate the findings to be reassessed in the light of these circumstances.

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

2. SITE CHARACTERISATION

2.1.1 A summary of the historical and environmental setting of the site is presented in Table 2-1. This information has been summarised from the information included within the Environmental Statement (Network Rail, 2019).

Table 2-1 Site Characterisation Summary

Item	Description
Current site description and use	The site comprises Huddersfield Station, centred on National Grid Reference (NGR) SE 414341E, 416900N in Huddersfield, West Yorkshire. The site is roughly rectangular in shape and covers approximately 2.2 ha in area. The site is an active railway station, and it is surrounded by residential and commercial areas. Huddersfield Station is located on a cut-fill platform, at approximately 85 m above ordnance datum (AOD) above naturally sloping ground which falls away to the south and east. The eastern end of the station is raised from the natural ground level.
Key historical land uses	The 2021 GIR indicates the 1826 Crosland map shows an approximately rectangular reservoir present in the southern part of the site, and the 1850 Nixon map shows a possible reservoir present beneath the off-site goods shed. Huddersfield Station and associated infrastructure, including buildings and railway sidings, are first shown on the 1893 map. To the west of the station the land included railway sidings and a goods shed. Whilst to the north, east and south the surrounding land contained residential and commercial areas. In addition, the surrounding land had the following industrial uses within 250 m of the site: a garage, a national shell factory, electrical substations, cuttings, a goods station, railway sidings, tanks, two infilled ponds and a historical petrol station.
Geology	**Superficial Deposits:** Head deposits are present beneath most of the station site and north of the station, whist no superficial deposits are recorded in the southern section of the site. **Bedrock:** Pennine Lower Coal Measures (PLCM) formation, comprising predominantly mudstones interbedded with sandstone and siltstones. The Middle Band Rock formation comprising sandstone is located adjacent the site's southern boundary. No geological faults are recorded on site.
Mining	A mining risk assessment was undertaken by Transpire Alliance in 2021 for W3, with key findings summarised below: • Coal Authority data only indicates 'underground working' of the Soft Bed seam, north of the site. However, the Coal Authority also shows areas of probable workings, where there is no recorded evidence (maps or plans) of workings. This is generally where a seam of mineable thickness exists at a shallow depth. Coal Authority data indicates 'probable shallow coal mine workings' corresponding with the site. This extent correlates with the underlying shallow Soft Bed seam as shown on geological maps. • No mine entries or adits are present within Huddersfield station or 20 m from the site boundary. • Known workings are present through Huddersfield South tunnel, directly to the south of the site. It is expected that the Soft Bed coal is at shallow depths (~10 m bgl) beneath Huddersfield Station with an assumed possible worked thickness of 1.7 m. Although there are no known workings on site, there are possible worked extents. The Soft Bed coal seam and associated fireclay, sub-crop and occur at shallow depth throughout the Huddersfield Tunnels and

Item	Description
	under the station area. The Soft Bed is a sulphur-free coal of fair quality, which has been widely worked to a considerable extent from the outcrop. • The MRA concluded that the site is within a high-risk area, with mitigation required. A grid of probing and grouting of voids is being undertaken (Stage 3 works) prior to the main construction phase.
Hydrogeology	**Superficial:** Secondary Undifferentiated Aquifer **Bedrock:** Secondary A Aquifer The site is not located within 250 m of a Source Protection Zone (SPZ). There are two groundwater abstraction licences recorded within 250 m of the site, but only one licence is registered as active. The active licence is located 194 m north-east and is registered to the Kirklees Council and relates to a heat pump. The 2021 Ground Investigation Report (GIR) (Transpire Alliance, 2021) states that groundwater flow was expected to be predominantly through fractures and discontinuities, and likely to be flowing towards the river basin towards the east.
Hydrology	No main rivers as designated by the Environment Agency, or other surface water features, are located within 250 m of the site. The nearest main river is the River Colne, situated approximately 1 km to the east of the site. The Huddersfield Broad Canal is located approximately 550 m east of the site. The 2021 Ground Investigation Report identified a masonry arch culvert daylighting onto John William Street beneath Huddersfield station. The culvert is orientated south-east to north-west and it is approximately 5 m below the ground. Based on the information contained in the historical maps, the 2021 GIR indicated it is likely the culvert collected water from the springs that were recorded on site prior to the station being built.
Landfills and Waste	There are no recorded active or historical landfill sites or waste management facilities located within 250 m of the site.
Discharge consents	There are no recorded groundwater discharge consents within 250 m of the site boundary. There are no discharge consents relating to surface water recorded within 250 m of the site.
Pollution Incidents	No pollution incidents have been recorded within 250 m of the site boundary.
Pollution Controls	Several historical and current pollution controls have been identified within 250 m of the site, including: • Two Licensed Pollutant Releases; • One Pollution Inventory Substance; and • One Licensed Industrial Activity. None of these activities were located on site.
Trade Directory Entries and Fuel Stations	Six trade directory entries/fuel stations were located on or within 250 m of the site boundary: • Train station; • Electrical substation; • Bus and coach station, depot; • Fuel distributors and suppliers; and, • Vehicle repairs, testing and servicing. One petrol station is located within 250 m of the site, which is operated by Tesco and is located approximately 90 m north-east of the site.
Sensitive Land Uses	The site is not located within 250 m of any statutory designated sites for nature conservation (for example, Sites of Special Scientific Interest, National/Local Nature Reserves, ancient woodland, etc.). The Huddersfield Broad Canal is a Local Wildlife Site (LWS).
Radon	The site is located within a radon affected area, as between 1 and 3% of properties are above the action level.

Item	Description
UXO Risk	A detailed unexploded ordnance (UXO) assessment was undertaken by 1st Line Defence for the wider TRU Scheme in February 2018 (1st Line Defence, 2018) using a 'buffer zone' forming a corridor either side of the existing railway. The UXO report concluded the railway was in a low-risk area and recommended site-specific UXO awareness briefings be given to all personnel conducting intrusive works. Further sub-surface assessments, including UXO and utility checks, on areas not covered by the initial assessment of the rail corridor, are implemented through Network Rail Health and Safety contractual requirements with its contractors.

3. GROUND INVESTIGATIONS

3.1.1 A number of phases of ground investigation have been undertaken within the site boundary to inform the design of the Scheme, including:

- BAM Ritchies (October 2018) SPO 13.2 Trial Pits Ground Investigation Report – Factual Account (Bam Ritchies, 2018) (BAM Ritchies, 2018);
- Structural Soils, Transpennine Route Upgrade; Zone 4 SPO 13.2 & 14.1a – Trial Pitting Huddersfield Viaduct (Structural Soils Limited, September 2018) (Structural Soils, 2018);
- Bam Ritchies, Transpennine Route Upgrade GI, W3 SPO13 – Automatic Ballast Sampling, Ground Investigation Report – Factual Account (Bam Ritchies, January 2021) (Bam Ritchies;, 2021);
- Bam Ritchies, Transpennine Route Upgrade GI, W3 GRIP4 Window Samples, Ground Investigation Report – Factual Account (Bam Ritchies, June 2022) (Bam Ritchies, 2022);
- Bam Ritchies, Transpennine Route Upgrade GI, W3A Area 1 – Automatic Ballast Sampling – GRIP 4, Ground Investigation Report – Factual Account (Bam Ritchies, December 2022) (Bam Ritchies, 2022);
- Structural Soils, Transpennine Route Upgrade; Factual Report on Ground Investigation; 151667-TSA-W3-MVL3-DM3-X-MF-702098 W3-MVL3-GRIP4 Huddersfield Viaduct and Station Survey Report (Structural Soils Limited, November 2022) (Structural Soils, 2022);
- Structural Soils, Transpennine Route Upgrade; Factual Report on Ground Investigation; 151667-TSA-W3-MVL3-DM3-X-MF-702322 W3-MVL3-Section 1 Window Sample Survey Report on Track (Structural Soils Limited, January 2023) (Structural Soils, 2023); and
- Bam Ritchies, Transpennine Route Upgrade GI, W3A Section 1 – Boreholes GRIP4 Pt1 TWAO, Ground Investigation Report – Factual Account (Bam Ritchies, January 2023) (Bam Ritchies, 2023).

3.1.2 BAM Ritchies and Structural Soils, site investigation contractors, were commissioned to undertake the ground investigation works to obtain information on the geotechnical and geo-environmental conditions at the site.

3.1.3 The aims of the investigations, with respect to land contamination, were to:

- Collect data on the ground conditions and groundwater;
- Collect soil and groundwater samples for laboratory analysis of potential contaminants of concern (identified from desk-based information); and
- Undertake ground gas and groundwater monitoring from installed wells.

3.1.4 A total of 34 exploratory boreholes, including cable percussive, windowless sampler and rotary cored boreholes, and eight machine dug trial pits were undertaken across the site during all phases of GI.

3.1.5 A summary of the findings of the ground investigation and contamination/gas risk assessments undertaken to date are provided below. A summary has been provided for the whole site, but also for the subway and footbridge with associated lift pits and motor rooms to allow for the presentation of data relevant to the gas risk and recommendations for protection measures specific to these structures. Full details are presented within the Phase 2 Land Contamination Risk Assessment (Network Rail, 2023).

Whole Huddersfield Station Site

3.1.6 Ground conditions encountered across the site generally comprised:

Table 3-1 Summary of ground conditions encountered across Huddersfield Station site

Top depth range (m bgl)	Top elevation range (m AOD)*	Thickness range (m)	Geology
0 to 0.5	88 to 89	0.2 to 1.0	Made Ground: Trackbed *Grey slightly sandy, angular coarse GRAVEL of granite and basalt, occasional brick, limestone, ash and clinker.*
0 to 0.8	88 to 89	0.3 to 7.0	Made Ground: Excluding trackbed *Soft to firm sandy gravelly CLAY. Gravel of mudstone and sandstone*
0.2 to 5.0	82 to 88	0 to 5.0	Head deposits *Soft to stiff sandy gravelly CLAY with cobbles. Gravel of mudstone and sandstone.*
1.0 to 10	78 to 88	n/a	PLCM mudstone and siltstone *Extremely weak to weak thinly laminated MUDSTONE. Distinctly weathered in places. Up to 3m of residual soil at the top of the unit.* *Very weak to moderately weak SILTSTONE.*
12	77	0.5	PLCM Soft Bed coal *Possible workings recorded in BH4114.*
5.0 to 13.0	84 to 75	n/a	PLCM sandstone *Weak to medium strong sandstone.*
8.0	82	n/a	PLCM limestone
Comments: Limestone is reported in historical borehole BH3_H. Limestone is not expected in the geological sequence, hence the borehole is assumed to sample a laterally discontinuous marine band. Fossiliferous material is also sampled in SE11NW51 at 8.3mBGL (~86mAOD) and 13mBGL (~81mAOD), and SE11NW53 at 17.5mBGL (~77mAOD).			

3.1.7 Groundwater strikes recorded during the investigations across the whole site ranged from 0.80 m bgl to 5.20 m bgl both of which were encountered within Made Ground.

3.1.8 Details of olfactory/visual evidence of hydrocarbon/chemical contamination recorded on logs, within the Made Ground, are outlined in Table 3-2.

Table 3-2 Summary of visual/olfactory evidence of contamination

Exploratory Hole	Depth (m bgl)	Strata	Comment
BH4115	0.70 to 1.20	Made Ground	Faint organic odour
BH4115A	0.20 to 0.90	Made Ground	Strong hydrocarbon odour
BH4511	1.40 to 1.65	Made Ground	Becoming black with hydrocarbon odour and visible contamination
BH4516	0.00 to 0.35	Made Ground	Hydrocarbon odour present
	0.35 to 0.65	Made Ground	Slight hydrocarbon odour
BH4517	0.00 to 0.35	Made Ground	Hydrocarbon odour present
	0.30 to 0.50	Made Ground	Slight hydrocarbon odour present
	1.50 to 2.00	Made Ground	Faint hydrocarbon odour, black clay
BH4521	0.40 to 0.62	Made Ground	Strong hydrocarbon odour
BH4691	0.80	Made Ground	Strong hydrocarbon odour (water ingress)
	1.20 to 1.60	Made Ground	Hydrocarbon odour

Exploratory Hole	Depth (m bgl)	Strata	Comment
BH4693	9.90 to 10.05	PLCM	Organic matter with slight odour
BH5082	6.10 to 7.55	PLCM	Occasional faint hydrocarbon odour and staining along joints and bedding fractures
	7.70 to 8.02	PLCM	Strong hydrocarbon odour

3.1.9 A maximum of four rounds of ground gas monitoring has been undertaken at seven locations across the site as summarised in Table 3-3 below.

Table 3-3 Summary of ground gas monitoring rounds undertaken at the site

Monitoring Round	Pressure (mbar)	Pressure Trend on lead up to monitoring round*	Exploratory holes monitored
11/02/2021	1018	Rising	BH4113
18/02/2021	994	Falling	
04/03/2021	1017	Falling	
29/03/2021	1011	Rising	
19/08/2021	1004	Fluctuating	BH4114, BH4689, BH4691, BH4693, BH5082
14/10/2021	1013	Falling	
11/11/2021	1011	Fluctuating	
25/02/2022	1011	Rising	
04/04/2022	996	Falling	BH4117
09/05/2022	1014	Rising	

*Measurements not recorded in the field and have been taken from an online source

3.1.10 Falling pressures coincided with monitoring events on four occasions. However, the pressure data obtained does not show the necessary frequency (i.e. hourly) to be able to confirm whether either these constitute “worst case” conditions as described in CL:AIRE TB17: Ground Gas Monitoring and Worst Case Conditions (CL:AIRE, 2018).

3.1.11 The following maximum concentrations for gases and maximum steady state for the flow were recorded across the monitoring rounds:

- Carbon Dioxide: 5.1 % v/v
- Methane: 7.0 % v/v
- Hydrogen Sulphide: 1 ppm
- Carbon Monoxide: 30 ppm
- Flow: 0.4 l/hr.

3.1.12 Ten soil samples and thirteen ballast samples were retrieved from across the site during the ground investigations and analysed for a range of contaminants. No exceedances of the respective GAC were recorded for any sample. Therefore, the analysed soils are unlikely to pose an unacceptable risk to human health based on commercial and public open space land uses. Asbestos was not identified within the 23 samples tested. However, there is a potential risk that asbestos could be found in Made Ground, and its mitigation, if found, should be considered as part of the construction works design. Hydrocarbons were recorded in concentrations above the laboratory Limit of Detection (LoD) within BH4115A and BH4521, which also coincide with the identification of hydrocarbon odours. It is possible that this is the source of these organic compounds within these locations.

3.1.13 Two soil samples were scheduled for soil leachate analysis, both of which were collected

from within the Made Ground. No exceedances of the DWS were recorded and three marginal exceedances of the EQS were recorded for lead (2) and zinc (1). Six groundwater samples were obtained during two monitoring rounds in 2021 from BH4114, BH4689, BH4691 and BH5082. Exceedances of the DWS for heavy metals, ammoniacal nitrogen and TPH fractions were recorded. The proposals for the site comprise hardstanding covering the majority of the site, which will inhibit infiltration onsite. This will significantly reduce leachate generation from contaminants present within onsite soils, and therefore onsite soils are not considered likely to pose an unacceptable risk to controlled waters. The majority of superficial soils are head deposits comprising clay which are low permeability materials. The concentrations of organic compounds would reduce during migration through the unsaturated zone due to natural processes such as adsorption and biodegradation. Therefore, risks to groundwater from contamination are considered low.

3.1.14 The findings of the ground investigations and subsequent risk assessment were used to refine the Conceptual Site Model (CSM) for the site and to inform the assessment of the risk levels posed by the identified potential contaminant linkages. The revised CSM is presented within the Phase 2 Land Contamination Risk Assessment (Network Rail, 2023).

Subway, associated lift pits and motor rooms

3.1.15 Exploratory holes undertaken within 30m of the proposed subway/lift pits include:

- BH4518
- BH5082
- BH4113
- BH4514
- BH4517
- BH4691
- BH4519
- BH4515
- TP4009
- TP4010

3.1.16 Ground conditions encountered within these locations have been summarised below:

- Made Ground:
  - Concrete and/or tarmacadam was recorded within three locations (BH4113, BH4515 and BH4519) from ground level to a maximum depth of 0.20 m bgl;
  - Ballast was recorded at ground level within on track locations in the form of clayey, sandy GRAVEL of granite. Thicknesses ranged from 0.40 to 0.70 m.
  - Granular Made Ground (silty, sandy GRAVEL of silty, clayey, gravelly SAND) was recorded in all ten exploratory holes within 30 m of the proposed subway/lift pits.
  - Cohesive Made Ground (sandy, gravelly CLAY) was recorded within four locations with a maximum thickness of 1.60 m recorded within BH4519. Cohesive Made Ground was generally recorded underlying granular Made Ground deposits.
- Superficial Clay deposits were encountered within BH4519 at 2.80 m bgl to 4.32 m bgl where the exploratory hole was terminated.
- Weathered Mudstone in the form of sandy gravelly CLAY and/or clayey, sandy, gravelly SILT was recorded within BH4517 and BH4515 underlying Made Ground, ranging in thickness between 0.47 m and 1.20 m.
- Bedrock of the PLCM (mudstone, siltstone and sandstone) was encountered within six exploratory holes, with top depths ranging from 0.70 m bgl to 2.00 m bgl.
- Coal was encountered within two locations – BH4113 at 9.00 m bgl and BH4961 at 9.94 m bgl. Coal thickness ranged from 0.26 m to 0.50 m.

3.1.17 Visual and/or olfactory evidence identified within the vicinity (30 m) of the proposed subway, lifts and motor rooms has been summarised in Table 3-4 below.

Table 3-4 Proposed subway, lift pits and motor room summary of visual/olfactory evidence of contamination

Exploratory Hole	Depth m bgl	Strata	Comment
BH4517	Ground level to 0.35	Made Ground	Hydrocarbon odour
	0.35 to 0.50	Made Ground	Slight hydrocarbon odour
	1.50 to 2.00	Made Ground	Faint hydrocarbon odour
BH4691	0.80	Made Ground	Water ingress with a very strong hydrocarbon odour
	1.20 to 1.60	Made Ground	Hydrocarbon odour
BH5082	6.10 to 7.55	PLCM	Occasional faint hydrocarbon odour and staining was noted along joints and bedding fractures within the sandstone bedrock
	7.70 to 8.02	PLCM	Strong hydrocarbon odour

3.1.18 Groundwater samples were collected from BH4691 and BH5082. Screening of determinands recorded TPH exceedances within the sample collected from BH4691 at 3.6 m bgl. No hydrocarbon exceedances were recorded within the sample collected from BH5082 at 7.20 m bgl.

3.1.19 PID readings were taken from samples collected from BH4518 and BH4961, with maximum concentrations ranging from 16.60 ppm (BH4518) to 49.80 ppm.

3.1.20 Groundwater levels recorded during monitoring within the vicinity of the proposed subway and associated lift pits are summarised below:

Table 3-5 Proposed subway, lift pits and motor room groundwater monitoring summary

Exploratory hole	Well screen range (m bgl)	Screened deposits	Min		Max	
			m bgl	m AOD	m bgl	m AOD
BH4113	1.5 to 4.5	PLCM: mudstone and gravel	3.03	86.10	3.43	85.70
BH4691	1.0 to 5.0	PLCM: mudstone	2.25	86.39	3.00	85.64
BH5082	1.5 to 10.0	PLCM: siltstone, mudstone, sandstone	5.30	83.77	7.30	81.77

3.1.21 Ground gas monitoring was undertaken within BH4113, BH4691 and BH5082 on four occasions, with results summarised below:

- Max methane: 3.2 % v/v
- Max carbon dioxide: 4.4 % v/v
- Max steady state flow rate: 0.4 l/hr
- Max hydrogen sulphide:1 ppm
- Max carbon monoxide: 1 ppm
- Min Oxygen: 2.5 % v/v

Footbridge, associated lift pits and motor rooms

3.1.22 Exploratory holes undertaken within 30m of the proposed footbridge/lift pits include:

- BH4114
- BH4114A
- BH4115
- BH4115A
- BH4117
- BH4520
- BH4521
- BH4522

3.1.23 Ground conditions encountered within these locations have been summarised below:

- Made Ground:
  - Concrete was recorded within BH4117 from ground level to 0.15 m bgl.
  - Ballast was encountered within five of the on-track exploratory holes from ground level to a maximum depth of 0.90 m bgl.
  - Granular Made Ground (gravelly SAND or sandy GRAVEL) was encountered within BH4114, BH4114A, BH4117 and BH4521 from ground level to a maximum depth of 5.00 m bgl. Gravel included ash, clinker and sandstone.
  - Cohesive Made Ground (sandy gravelly CLAY) was encountered within BH4522, BH4114, BH4114A, BH4115, BH4117 and BH4521 from 0.30 m bgl (top depth) to a maximum depth of 5.60 m bgl. Gravel included sandstone and mudstone.
  - Cohesive superficial deposits (sandy gravelly CLAY) were encountered within BH4114 between 1.20 and 5.06 m bgl and BH4114A between 3.45 and 6.00 m bgl (where the hole was terminated). Clay deposits were also recorded within BH4115 between 1.40 and 6.46 m bgl, BH4520 between 0.90 and 2.20 m bgl (terminated). Silt and clay were also encountered within BH4117 between 5.60 and 7.10 m bgl.
  - Weathered mudstone was recorded within BH4115A at 0.90 m bgl.
  - Bedrock of the PLCM was encountered within BH4114 at 5.06 m bgl and BH4115 at 6.46 m bgl and BH4117 at 7.10 m bgl.
  - No coal seams and/or voids were recorded within exploratory holes undertaken within 30 m of the proposed footbridge/lift pits and/or motor room.

3.1.24 A water strike was noted within BH4117 at 5.20 m bgl within the Made Ground. The strike rose to 5.00 m bgl after 20 minutes. Slight water ingress was also noted at BH4115 at 1.20 m bgl within Made Ground deposits.

3.1.25 Visual and/or olfactory evidence identified within the vicinity (30 m) of the proposed subway, lifts and motor rooms has been summarised in Table 3-5 below.

Table 3-6 Proposed footbridge, lift pits and motor room summary of visual/olfactory evidence of contamination

Exploratory Hole	Depth	Strata	Comment
BH4115	0.70 to 1.20	Made Ground	Faint organic odour
BH4115A	0.20 to 0.90	Made Ground	Strong hydrocarbon odour
BH4521	0.40 to 0.62	Made Ground	Strong hydrocarbon odour

3.1.26 Also, at 0.90 m bgl within BH4520 a geotextile membrane was recorded.

3.1.27 PID readings were recorded at four exploratory hole locations, with details of the maximum readings provided below.

Table 3-7 Proposed footbridge, lift pits and motor room summary of PID readings

Exploratory Hole	Max PID reading (ppm)	Depth	Strata
BH4522	26.70	1.20	Made Ground - Clay
BH4114A	13.00	2.50	Made Ground – Gravel
BH4520	8.20	0.80	Made Ground – Gravel
BH4521	9.30	0.50	Made Ground - Gravel

3.1.28 Groundwater levels recorded during monitoring within the vicinity of the proposed footbridge and associated lift pits are summarised below. BH4114 has been monitored on four occasions while BH4117 on two occasions.

Table 3-8 Proposed footbridge, lift pits and motor room summary of groundwater monitoring

Exploratory hole	Well screen range (m bgl)	Screened deposits	Min		Max	
			m bgl	m AOD	m bgl	m AOD
BH4114	0.8 to 6.8	Clay and PLCM (mudstone)	1.60	86.78	1.80	86.58
BH4117	5.0 to 8.0	Made Ground and Clay	3.5	84.93	3.5	84.93

3.1.29 Ground gas monitoring was undertaken within BH4114 and BH4117 on four occasions, with results summarised below:

- Max methane: 1.6 % v/v
- Max carbon dioxide: 4.5 % v/v
- Max steady state flow rate: 0.3 l/hr
- Max hydrogen sulphide: 0 ppm
- Max carbon monoxide: 1 ppm
- Min Oxygen: 0.6 % v/v

4. REMEDIATION STATEMENT

4.1 Introduction

4.1.1 The risk assessments presented in the Phase 2 Land Contamination Assessment (Network Rail, 2023) indicated that potentially unacceptable risks to human health and/or property exist at the site from ground/mine gas. However, it is considered that through the implementation of the measures outlined below the risks identified can be appropriately mitigated.

4.2 Identification of Unacceptable Risk

4.2.1 Overall, the site is considered to pose a moderate/low risk to identified receptors with the exception of ground/mine gas which was considered to pose a high risk to human health and property. Therefore, it is considered necessary that mitigation measures be put in place to reduce the risk posed by ground/mine gas at the site.

4.2.2 It is deemed necessary to undertake the following:

- Gas mitigation requirements for subway, lift pits and motor rooms;
- Gas mitigation if required by drainage design, including the proposed attenuation tank;
- Asbestos watching brief during excavation activities;
- Design of protective mitigation for new potable water supplies with Statutory Undertaker;
- A piling risk assessment in accordance with Environment Agency guidance, which was undertaken in June 2023 (Network Rail, 2023);
- Use of appropriate chemically resistant concrete and plastic;
- Validation of soils for reuse or imported will be required;
- Decommissioning of monitoring wells prior to construction;
- Ensure that a procedure is in place for encountering unexpected ground conditions/contamination; and
- Should excess arisings require off-site disposal, in the vicinity of previously identified hydrocarbons, these may be classified as hazardous waste and an appropriate duty of care should be followed.

4.3 Ground/Mine Gas

4.3.1 The ground gas risk assessment undertaken as part of the Phase 2 Land Contamination Risk Assessment (Network Rail, 2023) identified the following potential sources of ground gas at the site; Made Ground, coal seams/mine workings and areas of off-site infilled land (ponds and reservoir). Also, it should be noted that the current station was constructed upon an artificial platform. Made Ground was encountered during the ground investigation, however, thicknesses encountered were unlikely to pose an unacceptable risk. Putrescible ground gas generating material was not encountered within Made Ground during the ground investigation, however, hydrocarbon odours were recorded within a number of locations. Soil and groundwater analysis did not identify any concentrations of volatile compound which would pose an unacceptable risk to human health.

4.3.2 It was determined that the main source of ground/mine gas was from the coal seams/mine workings underlying the site. During the ground investigation, the Soft Bed seam was recorded onsite in eight locations (~10 m bgl) and voids (possible workings) were recorded in two locations (7.0 to 8.0 m bgl). The MRA concluded that the site is located within a high-risk area and therefore mitigation would be required. A grid of probing and grouting of voids is due to be undertaken at the site prior to construction, reducing the likelihood of mine gas

migration.

4.3.3 The Piling Risk Assessment undertaken in June 2023 indicated that there was a low/moderate risk from ground/mine gas during construction and a low risk from ground/mine gas during operation. It was indicated that any pathway created by rotary bored piling is likely to be temporary while the pile is installed and grouted. Once grouted the pathway is no longer present.

4.3.4 Water strikes and groundwater monitoring data consistently recorded groundwater levels between 1.6 - 7.3 m bgl within superficial deposits and bedrock. However, it should be noted that BH4693 was consistently measured as being dry at a depth of 10.00 m bgl.

4.3.5 The proposed works at the site includes a number of structures which may allow for gas accumulation including:

- Extension of passenger subway, associated lift pits and motor rooms; and
- Lift pits and motor rooms associated with the construction of a new passenger footbridge.

4.3.6 It is assumed that the subway will be open at both ends, with an entrance/exit also for the middle platform, and therefore ventilated, reducing the likelihood of ground gas build up. Due to the high water levels encountered at the site, it is anticipated that foundations of the structures will be in contact with groundwater underlying the site.

4.3.7 It is also assumed that the attenuation tank is unlikely to be entered and if access is required for maintenance purposes, it is likely that this would be undertaken under confined space control measures by a suitably trained/qualified person. Also, the attenuation tank and associated drainage pipework are unlikely to be a closed, air tight system, reducing the likelihood of gas accumulation in quantities sufficient to pose an unacceptable risk. The risk of gas accumulation posed to the attenuation tank and drainage system should be considered during design and has therefore not been considered when establishing specific gas protection measures requirements.

Entire Huddersfield Station Site

4.3.8 The site is within a high risk zone for mine gas due to presence of shallow workings <10 m bgl that might not be flooded (CL:AIRE, 2021). Carbon dioxide, carbon monoxide and methane have been recorded, with occasional hydrogen sulphide. Depleted levels of oxygen have been regularly recorded in the upper 5m of Made Ground/bedrock (Network Rail, 2023).

4.3.9 Based on the assessment undertaken within the Phase 2 Report, the site has been classified as CS2 (Low Risk – gas mitigation required). This represents a precautionary approach, as following consideration of the CSM the Characteristic Situation was upgraded from CS1 to CS2 as carbon dioxide and methane were regularly recorded above 5% v/v and 1% v/v, respectively. A CS2 classification was also determined due to the shallow nature of the recorded coal seams and voids.

Subway, lift pits and motor room

4.3.10 Based upon the gas data collected from the three boreholes installed within 30 m of the proposed structures the calculated GSV for the site would be 0.0176 l/hr which would result in a characteristic situation 1 (CS1) or very low risk. However, as advised within BS8485, concentrations >1 % v/v of methane were recorded, and therefore the characteristic situation has been increased to CS2 (low risk).

4.3.11 Possible coal workings are recorded within 30 m of the structures at 9.00 m bgl and 9.94 m

bgl. Groundwater levels recorded within the vicinity of the subway/lift pits and motor room ranged from 2.25 m bgl to 7.30 m bgl. This indicates that the coal seams and/or voids within the vicinity of the subway were consistently below groundwater level and flooded.

Footbridge, lift pits and motor room

4.3.12 Based upon the gas data collected from the two boreholes installed within 30 m of the proposed structures the calculated GSV for the site would be 0.0135 l/hr which would result in a characteristic situation 1 (CS1) or very low risk. However, as advised within BS8485, concentrations >1 % v/v of methane were recorded, and therefore the characteristic situation has been increased to CS2 (low risk). No coal seams and/or voids were recorded on exploratory holes logs undertaken within 30 m of the proposed footbridge/lift pits and motor room.

Gas Protection Measures

4.3.13 The guidance provided within BS8485:2019 has been utilised to establish the level of gas protection measures required at the site. It is acknowledged that the guidance provided within BS8485:2019 relates to buildings, not subways and/or lift pits. However, the guidance has been utilised as a conservative measure. According to BS8485:2015+A1:2019 (British Standards Institution, 2019), the proposed structures on site would be classified as Type C (lift motor rooms) or Type D (subway extension and lift pits) buildings. A gas protection score of 2.5 must be achieved to be protective of a Type C Building for a CS2 scenario, and a score of 1.5 must be achieved to be protective of a Type D Building for a CS2 scenario. A combination of two or more of the following three types of protection measures (which are detailed in BS8485:2019) should be utilised to achieve this score:

- the structural barrier of the floor slab;
- ventilation measures; and/or
- gas resistant membrane.

Structural Barrier

4.3.14 Due to the shallow groundwater levels recorded across the site, it is likely that floor slab and foundations associated with the subway and lift pits (including those associated with the footbridge) will interact with groundwater. It is anticipated that waterproofing would be required as part of the design of the structures located below ground level. Therefore, it is assumed that either Grade 2 or Grade 3 waterproofing will be installed as part of the design of these structures. The associated scores have been provided within Table 4-1 below.

Table 4-1 - Gas protection scores for the structural barrier

Floor and substructure design	Score
Basement floor and walls conforming to BS8102:2022, Grade 2 waterproofing	2
Basement floor and walls conforming to BS8102: 2022, Grade 3 waterproofing	2.5

Ventilation measures

4.3.15 To achieve the required gas protection score of 1.5 and/or 2.5 as per BS8485, ventilation measures could be introduced as part of the design, such as those outlined in Table 4-2. However, the applicability of these measures to the subway, lift pits and motor room should be reviewed by the building/foundations designer. Ventilation measures are unlikely to be suitable at the site due to the nature of the structures, ground conditions encountered and shallow depth to groundwater. However, details relating to the types of ventilation measures and related gas protection scores have been provided for completeness. Ventilation protection measures could be one of the following five types (outlined in Table 4-2 below),

and points can only be scored for one of these measures.

Table 4-2 - Gas Protection Scores for Ventilation Protection Measures

Protection element/system	Description	Score
Pressure relief pathway	usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building	0.5
Passive sub floor dispersal layer	Media used to provide the dispersal layer are: • Clear void • Polystyrene void former blanket • Geocomposite void former blanket • No-fines gravel layer with gas drains • No-fines gravel layer	1.5 to 2.5
Active dispersal layer	usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers	1.5 to 2.5
Active positive pressurisation	creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket	1.5 to 2.5
Ventilated basement substructure present	floor slab of occupied part of the building under consideration is underlain by a basement	4

Gas Resistant Membrane

4.3.16 Gas resistant membranes can also be specified as part of the design to achieve the required gas protection score of 1.5 and/or 2.5 as outlined in BS8485. Gas resistant membranes should be:

- sufficiently impervious to methane and carbon dioxide;
- capable after installation of providing a complete barrier to the entry of the relevant gas.
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- sufficiently strong to withstand in service stresses (e.g. due to ground settlement if placed below a floor slab);
- sufficiently strong to withstand the installation process and following construction activities until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, and dropping tools); and
- chemically resistant to degradation by other contaminants that might be present.

4.3.17 The installation and verification of a gas resistant membrane provides a score of 2 in accordance with BS8485:2019.

Recommendations

4.3.18 Due to the identified potential for gas migration from the shallow coal mine workings and ingress into the outlined structures, gas protection measures are required as part of the design and construction of these features. Based on the recommended CS2 classification and Type C/Type D building classification in accordance with BS8485:2019, a gas protection score of 2.5 and 1.5 respectively, needs to be achieved to satisfy the gas protection measures required.

4.3.19 The gas protection score can be achieved by utilising a combination of the following three mitigation measures; waterproofing, gas resistant membrane and/or ventilation measures. A gas protection score of 1.5 and/or 2.5 needs to be met using a combination of the following:

- Water Proofing
  - Grade 2 waterproofing – 2.0 points
  - Grade 3 waterproofing – 2.5 points
- Gas resistant membrane
  - Installation and verification of gas resistant membrane – 2.0 points
- Ventilation Measures
  - Ventilation protection measures could be one of five types with points ranging from 0.5 to 4.0

4.3.20 It is the responsibility of the Structure/Foundation Designer to ensure the appropriate level of gas protection is included within the building design drawings and reports in accordance with BS8485:2019 to provide sufficient protection to meet with the requirements of Characteristic Situation 2. The gas protection measures must be installed and verified by suitably qualified and experienced staff in accordance with BS8485:2019 (British Standards Institution, 2019), CIRIA C735 (CIRIA, 2014) and CIRIA C801 (CIRIA, 2021). It is recommended that personnel involved in inspecting/verifying the gas protection measures are accredited under the CL:AIRE Gas Protection Verification Accreditation Scheme (https://www.claire.co.uk/projects-and-initiatives/gpvs).

4.4 Watching Brief

4.4.1 A watching brief is to be employed throughout earthworks activities (i.e. materials excavation, movement, stockpiling and placement). Details of the requirements of the watching brief will be relayed to site staff by way of “toolbox talks” or other similar processes to ensure all site staff are fully aware of what is required.

4.4.2 All site staff and operatives will be instructed to report any previously unidentified potentially contaminated ground and if such is encountered then the procedure outlined in Section 4.13 will be followed.

4.4.3 Vigilance should be maintained during excavation of service trenches and if putrescible/organic material, suspected old workings or a coal seam are encountered then it is recommended that specialists in gas assessment are consulted to consider whether mitigation measures (e.g. clay stanks) are required to minimise the potential for lateral gas migration to off-site human/building receptors.

4.4.4 The occurrence of such incidents, the type and volumes of material affected, measures taken, test results and final re-use / disposal measure should all be recorded and included within a verification report.

4.5 Confirmatory Testing of Site Won and Imported Materials

Verification Sampling Frequency

4.5.1 The general frequency of verification testing for site won and imported fill materials is presented in Table 4-3 (or as described in the sites earthworks specification, which will take precedence over Table 4-3).

4.5.2 Any soils or soil-forming materials imported to site should be shown to be suitable for use by way of testing to an appropriate suite and frequency (prior to importation where at all possible). The precise details of the suite and frequencies will depend on aspects such as the nature of the material, volume to be imported, any pre-existing test results, place of use etc. and hence should be agreed with the relevant regulatory parties in advance. Where required advice will be sought from a suitably experienced geo-environmental specialist.

Table 4-3 Frequency of sampling for verification purposes

Material Type	Site Won	Imported
Greenfield (no evidence of previous development or mining) and manufactured soils.	1 sample per 500 m^3 (minimum of 3)	1 sample per 250 m^3 (minimum of 3)
Superficial deposits	1 sample per 500 m^3 (minimum of 3)	1 sample per 250 m^3 (minimum of 3)
Made Ground/soils from a brownfield site	1 sample per 250 m^3 (minimum of 3)	1 sample per 100 m^3 (minimum of 3)

4.5.3 Notwithstanding the above, as a minimum, three samples shall be collected from each imported source.

4.5.4 Any material with visual and/or olfactory evidence of contamination should be segregated from visually clean materials during the ground works to allow for further verification testing.

Import criteria (Limiting Values)

4.5.5 It is not anticipated that excavated material will be reused within the site. All imported materials must meet the requirements of the Scheme's earthworks specification. Materials should be sampled and tested in accordance with the Scheme's earthworks specification (and contaminant concentrations should be less than the Limiting Values detailed within the Scheme's earthworks specification). If the Limiting Values are exceeded, then advice should be sought from a contamination specialist as further risk assessment will be required.

4.6 Piling – Controlled Waters Risk Assessment

4.6.1 The controlled waters risk assessment (Network Rail, 2023) concluded the scheme generally poses a moderate/low risk to controlled waters. A piling risk assessment in accordance with Environment Agency guidance has been undertaken for the site (Network Rail, 2023). The assessment was undertaken based on the proposed use of bored piles, a non-displacement piling method. The identified depth to groundwater indicates that all piles are expected to intersect groundwater and terminated in the bedrock of the PLCM (secondary A aquifer). Based on the assessment undertaken, the risk rating for bored piles was low to moderate for all pollution and risk scenarios.

4.6.2 Recommendations outlined within the PRA to further mitigate any potential risk include:

- Contractors are to be made aware of potential for contamination to be present in Made Ground, across the entire site. Take a 'watching brief' approach. Monitor the composition of arisings. Seek advice if contaminated material encountered. Implement appropriate health and safety measures (e.g. use of personal protection equipment).
- Use aquifer protection measures during drilling (e.g. telescopic drilling) to inhibit downward migration of identified concentrations of determinands through low permeability layers.
- Ensure good workmanship during construction to ensure the hole does not collapse and soil does not migrate vertically into the underlying secondary A aquifer.
- The addition of grout/concrete as soon as practicable after drilling to quickly close any potential pathway;
- Elevated hazardous ground gas was not identified. However, due consideration of risk and reasonable mitigation during piling e.g. use of gas alarms, is recommended.
- Arisings to be dealt with as per an applicable materials management plan, if to be re-used on site, or under an appropriate duty of care if to be disposed of off-site.
- Classification of ground conditions is to be undertaken by the piling design team. Appropriate material grade for piles are to be selected based on the ground conditions and aggressivity following appropriate guidance/legislation.
- A high slump concrete mix is recommended for the pile within the bore to reduce the risk of potentially contaminating the groundwater in the secondary A aquifer. Careful monitoring of grouting rates and total volume used, compared to predicted volumes to provide an early indication of potential migration.
- Ensure no under-rotation of augers (if used within excavation) to prevent material being pushed downwards into the aquifer.

4.7 Asbestos

4.7.1 Asbestos was not identified by the laboratory within soil samples collected during the ground investigations undertaken at the site. However, the potential risk posed to the workforce and public during excavation/placement will be assessed by an asbestos specialist to confirm what mitigation measures (if any) are required during construction.

4.7.2 As with any previously developed land, or where fill has been placed, there is a potential for asbestos to be present and site staff should remain vigilant for potential asbestos containing materials. Should any further asbestos containing material be encountered during construction advice will be sought from an appropriately qualified specialist with regard disposal or re-use options.

4.8 Waste Management

4.8.1 All wastes generated at the site that are destined for landfill, if practical should undergo pre-treatment to reduce the volume or hazardous nature of the waste. Treatment may comprise any physical, thermal, chemical or biological processes, including sorting, that changes the characteristics of the waste.

4.8.2 Waste will be managed in accordance with the principles set out in the Code of Construction Practice (Part A)[1] and Code of Construction Practice (Part B) documents submitted against

[1] Ch02 Scheme description - App 2-1 - CoCP Part A.pdf (windows.net)

the Deemed Planning Permission Condition 5 (Stage 4), including the PPICP[2] and Waste Management Plan[3].

4.8.3 Where appropriate, ballast will be removed to one of Network Rail's Aggregate Handling Depots (AHD) to be recycled for use on the railway network and would have to meet the AHD's verification criteria before being dispatched for re-use.

4.9 Treatment of mine workings

4.9.1 The treatment of shallow mine workings (e.g. probe and grout) beneath the scheme is beyond the remit of this report and was carried out as part of the Stage 3 works. Treatment requirements and assessment of the potential risk posed by possible displacement of mine/ground gas and/or mine water during mine stabilisation works will be considered within the design of such activities in line with current guidance. The proposed treatment of mine workings at the site has been agreed with the Coal Authority.

4.10 Variations, Uncertainties and Queries Arising

4.10.1 During works, should variations to the above become necessary, or should there be uncertainties to queries over required actions, a suitably experienced land contamination specialist should be consulted in the first instance.

4.11 Unexpected ground conditions

4.11.1 Where any unexpected contaminated materials and/or previously unrecorded ground conditions are encountered during construction, works should temporarily cease in the affected area to enable inspection (and sampling/testing if necessary) by a suitably qualified land contamination specialist. The type of contaminated materials include, but are not limited to, any materials showing signs of visual and/or olfactory evidence of contamination, soils impacted by solvents or hydrocarbons, materials suspected of containing asbestos (whether fibrous, board or corrugated material), highly coloured materials or buried areas of biodegradable or domestic wastes.

4.11.2 The area shall be fenced off and made safe until an appropriate risk assessment has been undertaken by suitably experienced specialists, who will confirm what alterations to the remedial statement are required and obtained agreement from the contaminated land officers from Kirklees Council and/or the Environment Agency.

4.11.3 Details of the location, type and final destination of all previously unidentified materials encountered during the works should be recorded. Stockpiles of unexpected contamination should be segregated from other excavation arisings and be placed on a bunded low permeability liner, covered in plastic to minimise dust generation and surface run-off, with signs placed stating the nature of the material etc. Proposed stockpile areas should be adequately tested prior to and after use.

4.11.4 Any materials that do not meet the re-use criteria will require off-site disposal. Any disposal / transfer of surplus materials must be carried out under appropriate waste management and

[2] Document Reference: 151667-TSA-00-TRU-REP-W-EN-001240

[3] Document Reference: 151667-TSA-00-TRU-REP-W-EN-001241

duty of care requirements.

4.12 Potable Water Supply Pipes

4.12.1 As part of the proposed works the existing tea rooms are to be relocated within the current island platform (timber structure to be dismantled and reconstructed). The current water supply to the tea rooms may also need to undergo modification.

4.12.2 With regard to underground potable water pipes, the advice of the Statutory Water Authority should be sought who should be provided with a copy of the ground investigation report. The contractor/designer may be required to undertake and submit a risk assessment in accordance with UK Water Industry research Ltd (UKWIR) guidance (UK Water Industry Research Ltd, 2011).

4.13 Buried Concrete

4.13.1 Concrete foundations for the new structures will require an appropriate design of concrete classification. The classification of ground conditions is to be undertaken by the piling/foundation design team. The appropriate material grade for foundations is to be selected based on the ground conditions and aggressivity following appropriate guidance/legislation.

4.14 Decommissioning Old Monitoring Wells

4.14.1 Groundwater/gas monitoring wells installed historically and recently should be located and decommissioned in accordance with the Environment Agency guidance document ‘Good Practice for Decommissioning Redundant Boreholes and Wells’, dated October 2012 (Environment Agency, 2012). This must be undertaken prior to commencement of any construction works in the vicinity of the monitoring wells in order to prevent the inadvertent creation of contaminant or ground/mine gas migration pathways.

5. VERIFICATION REPORT

5.1.1 The verification report shall be prepared by land contamination specialists in accordance with the Environment Agency's Guidance on how to verify remediation contained within the Land Contamination Risk Management Tool (Environment Agency, 2023) and, if required, the MMP verification plan requirements of CL:AIRE's The Definition of Waste: Development Industry Code of Practice, Version 2 (CL:AIRE, 2011), although it is assumed there will be no reuse of excavated material. The verification report shall provide a complete record of the above mentioned activities on site and the data collected during construction.

5.1.2 Throughout the enabling/construction works it is essential that lines of evidence (e.g. photographs, test results, plans showing material movements/stockpiling, well decommissioning records) should be collected regularly by appropriately experienced personnel to confirm that the remediation statement (and MMP, if such is needed) has been complied with. The verification report for the site should include:

- Background information – project and site details, appropriate site plans, Employer's requirements, summary of previous ground investigation and risk assessments, conceptual model and remediation objectives;
- Verification of the installation of gas protection measures in accordance with BS8485:2019 (British Standards Institution, 2019), CIRIA C735 (CIRIA, 2014) and CIRIA C801 (CIRIA, 2021);
- Chemical and physical testing results with laboratory/test method accreditation details and confirmation materials pass re-use or import criteria and if it does not, provide details of contingency measures carried out (e.g. additional risk assessment, sampling, etc);
- Volumes, sources and quality of re-used materials (including survey drawings showing where site-won materials were excavated, stockpiled and placed to enable tracking of materials);
- Volumes, source and quality of imported materials (including land contamination desk study confirming source sites' history and geology, ground investigation reports, test results and if available MMP details of the source site);
- Details on ballast imported to site from one of Network Rails Aggregate Handling Depots (AHD) are to be recorded and included within the report;
- Details of any contingency arrangements (e.g. unexpected contamination/ground conditions) and how these were investigated/assessed and confirmation of any revised remedial actions;
- Details of decommissioning of the monitoring wells;
- Final site conditions;
- Third party contacts – correspondence and approvals/agreements from regulators, site visits, statutory guidance, third party agreements, etc;
- Supporting information – plans, as-built drawings (showing where materials placed, details of gas mitigation measures), progress photographs and reports, analytical results, H&S, QA, environmental monitoring, method statements, copies of consignment/delivery notes;
- Details of the verification testing of materials re-used on site and those imported onto site.

6. REFERENCES

1st Line Defence. (2018). *Detailed Unexploded Ordnance (UXO) Risk Assessment.*

BAM Ritchies. (2018). *SPP 13.2 Trial Pits Ground Investigation Report – Factual Account.*

Bam Ritchies. (2022). *W3 Grip 4 - Window Samples, Ground Investigation Report - Factual Account.*

Bam Ritchies. (2022). *W3A Area 1 – Automatic Ballast Sampling – GRIP 4, Ground Investigation Report.*

Bam Ritchies. (2023). *W3A Section 1 – Boreholes GRIP4 Pt1 TWAO, Ground Investigation Report – Factual Account.*

Bam Ritchies;. (2021). *W3 SPO13 – Automatic Ballast Sampling, Ground Investigation Report – Factual Account.*

British Standards Institution. (2019). *BS8485:2019 - Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.*

CL:AIRE. (2011). *Definition of Waste: Development Indisutry Code of Practice.*

CL:AIRE. (2018). *Ground Gas Monitoring and 'Worst-Case' Conditions.*

CL:AIRE. (2021). *Good Practice for Risk Assessment for Coal Mine Gas Emissions.*

Environment Agency. (2012). *Good Practice for Decommissioning Redundant Boreholes and Wells.*

Environment Agency. (2023). *Land Contamination Risk Management*. Retrieved December 2020, from https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks.

Network Rail. (2019). *Environmental Statement Volume 2ii: Huddersfield.*

Network Rail. (2022). *W3 - GEO - Mining Risk Mitigation Remit: Report and Drawings.*

Network Rail. (2023). *Huddersfield Station; Phase 2 Land Contamination Risk Assessment.*

Network Rail. (2023). *Huddersfield Station; Piling Risk Assessment.*

Structural Soils. (2018). *Zone 4 SPO 13.2 & 14.1a – Trial Pitting Huddersfield Viaduct .*

Structural Soils. (2022). *W3-MVL3-GRIP4 Huddersfield Viaduct and Station Survey Report.*

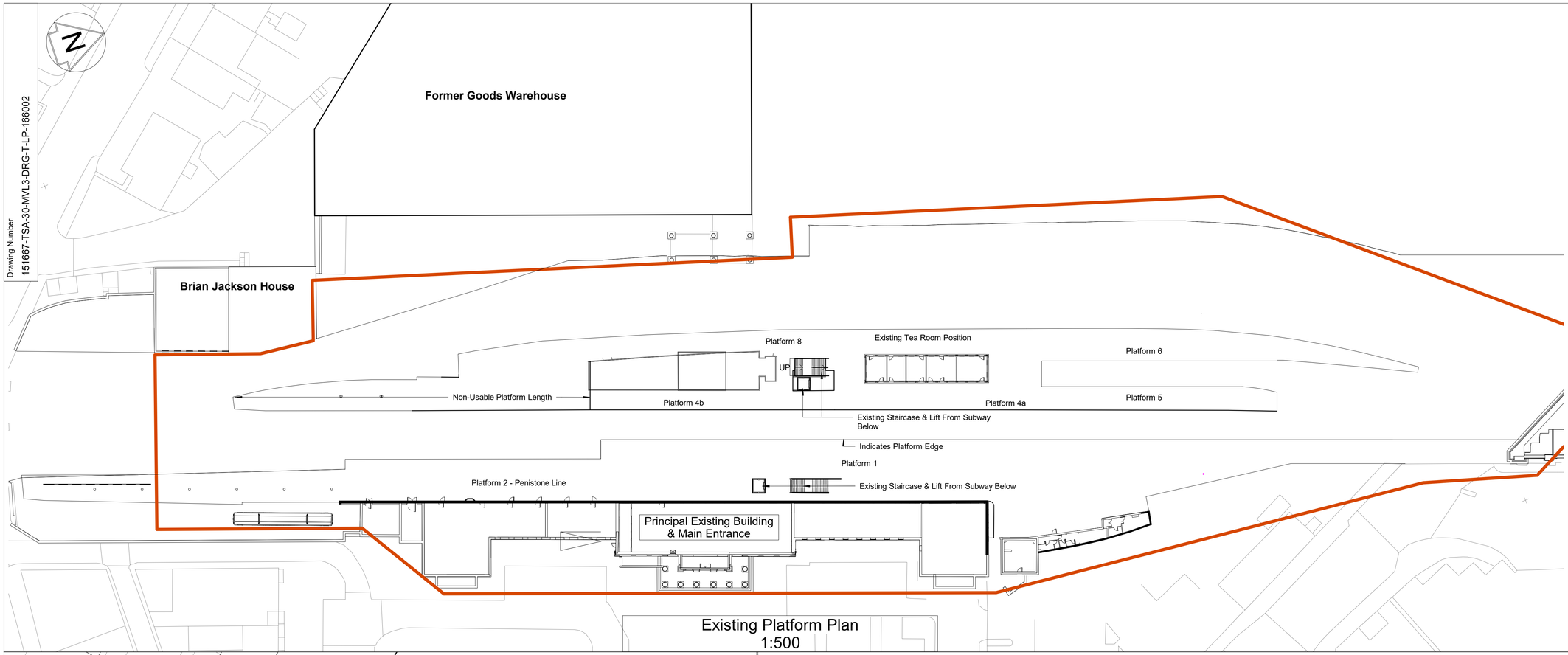
Structural Soils. (2023). *WS-MVL3-Section 1 Window Sample Survey Report on Track.*

Transpire Alliance. (2021). *Ground Investigation Report for W3.1 Gledholt to Huddersfield Viaduct;151667-TSA-30-MVL3-REP-W-GE-030110.*

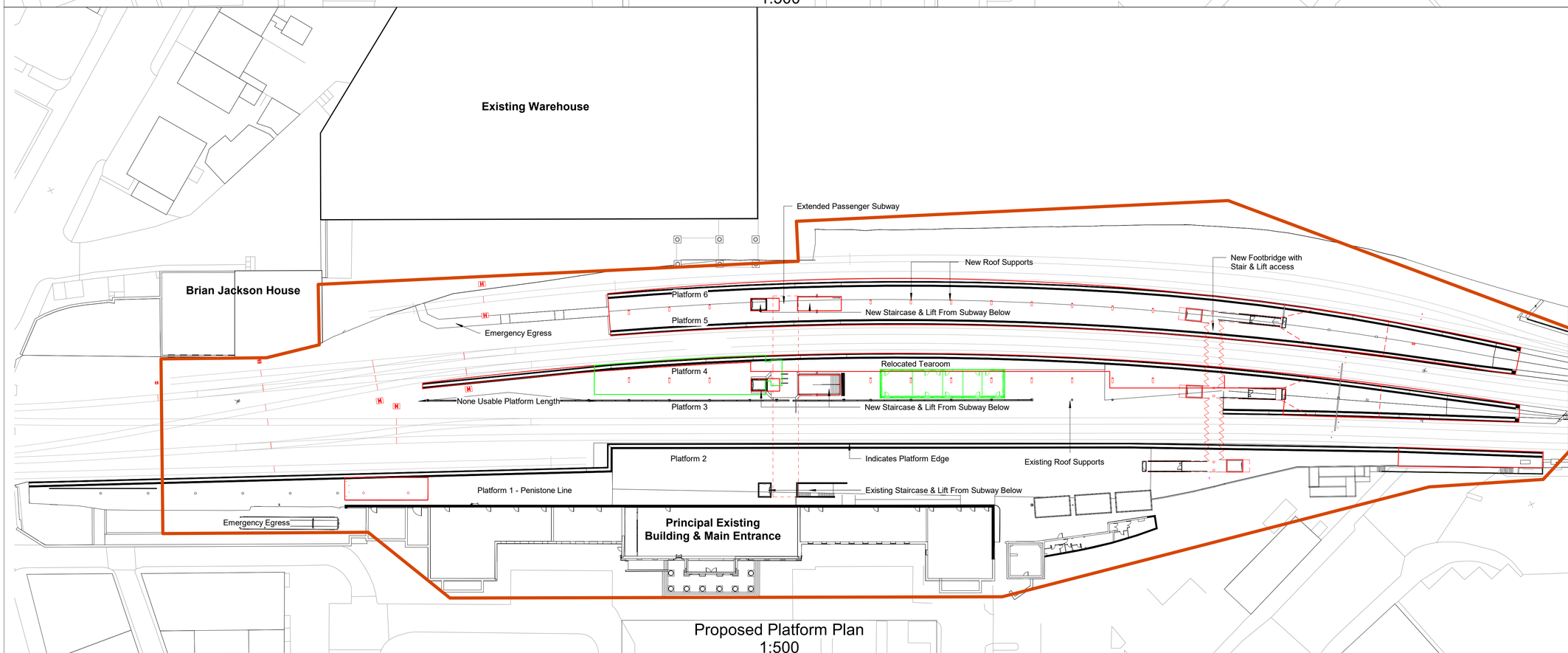
UK Water Industry Research Ltd. (2011). *Guidance for the selection of water supply pipes to be used in brownfield sites.*

APPENDIX A – FIGURES

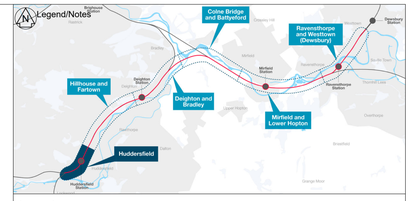
Drawing Number
151667-TSA-30-MVL3-DRG-T-LP-166002



Existing Platform Plan
1:500



Proposed Platform Plan
1:500



Legend

- Retained Rail Infrastructure
- Remove/Modified Rail Infrastructure
- Proposed Rail Infrastructure
- LBC Application Boundary

Notes

1. All dimensions are in millimetres unless stated otherwise.
2. Do not scale from this drawing
3. In constructing or maintaining the Works identified as Scheduled Works in Schedule 1 of the Network Rail (Huddersfield to Westtown (Dewsbury) Improvements Order Network Rail may deviate from he dimensions shown on this drawing to the extent permitted by the Order.
4. Overhead Line Equipment wires omitted for clarity.

SCALE
0m 5 10 25 50
SCALE 1:500

THE NETWORK RAIL (HUDDERSFIELD TO WESTTOWN (DEWSBURY) IMPROVEMENTS) ORDER

Rev	Date	Description of Revisions	Drawn	Chkd
P01	05.03.21	First Issue	LP	MS

Status: Fit for Contractor Design
Suitability: D3

Network Rail

Authorised	T Rivero	Signed	Date 05/03/21

Contractor(s): TRU – West Alliance

Location/Level: STALYBRIDGE STN - HEATON LODGE JN (HUDD-MANC LINE)

Type	CAD Drawing	Sub-type	Detail
Role	Town and Country Planner	Sub-Role	General
Zone	Huddersfield		
Phasing	Proposed	Grip Stage	0

Project: Transpennine Route Upgrade

Contract no.: 151667

Contract Title: TRU – West of Leeds

Drawing Title: Listed Building Consent Drawings
Huddersfield Station
Existing and Proposed Platform Level GA

Designed	J Clayton	Signed	Date 05/03/21
Drawn	L Priest	Signed	Date 05/03/21
Checked	M Steele	Signed	Date 05/03/21
Approved	R Gee	Signed	Date 05/03/21

Scale(s)	As indicated	ELR & Mileage	25.1188 to 25.1428
Alternative Reference		Sheet	1 of 1
Drawing Number	151667-TSA-30-MVL3-DRG-T-LP-166002	Revision	P01

Sheet Size A1 594 x 841