

# **Network Rail (Huddersfield to Westtown (Dewsbury) Improvements) Order**

## **Condition 5b(x): Environmental Design Plan (Land Contamination and Hydrogeology) – Stage 4**

**Document reference: 151667-TSA-00-TRU-REP-W-EN-001244**

**Network Rail**

**June 2023**



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## **1. INTRODUCTION**

### **1.1 Background**

- 1.1.1 The Scheme is part of a wider programme of works under the Transpennine Route Upgrade (TRU) which will improve the Transpennine railway between Manchester, Huddersfield, Leeds and York and improve connections between key towns and cities across the north of England.
- 1.1.2 Planning Direction for the Huddersfield to Westtown (Dewsbury) section of the TRU was received from the Department for Transport, referenced TWA/21/APP/03, dated 13 October 2022.
- 1.1.3 This document sets out details in relation to Condition 5b(x) of the Deemed Planning Permission.

## 2. STAGED APPROACH TO DISCHARGE AND SCHEME DESCRIPTION

- 2.1.1 As set out in document ref: 151667-TSA-00-TRU-REP-W-EN-001189 version 3 (submitted in relation to Condition 3 of the Deemed Planning) a staged approach is proposed in relation to discharge of the deemed planning conditions.
- 2.1.2 This document sets out details in relation to Stage 4 of the works for the Huddersfield to Westtown (Dewsbury) Scheme.
- 2.1.3 Stage 4 comprises the main civils works at Huddersfield Station and Huddersfield Viaduct (Stage 4 limits are set as Westgate Overbridge and Hillhouse Lane Underbridge) and are set out in Table 2-1, as well as links to the relevant planning drawings. Figure 1 in Appendix A shows the geographical locations of the works. Route drawings relevant to Stage 4 are [NR13 Planning Drawing - Route Drawing 3](#) and [NR13 Planning Drawing - Route Drawing 4](#).
- 2.1.4 Works within the Huddersfield and Gledholt tunnels, to the west of the station, will be detailed in the Stage 5 submission.
- 2.1.5 The entire Scheme will be subject to electrification; details of the electrification works will be detailed in the Stage 5 submission.
- 2.1.6 At Huddersfield Station, remodelling works are required with alterations to platforms and roof structures required to facilitate the delivery of a four track railway. East of Huddersfield Station the four-track railway is reinstated across the viaduct.
- 2.1.7 There are existing earthworks throughout the Scheme area associated with the existing operational railway. Earthworks allow the track to stay relatively level through a varied topography and allows trains to operate more efficiently by reducing the need for additional acceleration and deceleration to climb and descend climbs.
- 2.1.8 As set out in Figure 2-1<sup>1</sup> in Volume 4 of the Environmental Statement (ES) and Table 2-4 in Chapter 2: Scheme Description (Route Section 1)<sup>2</sup> in Volume 2i of the ES, a 55m length retaining structure (0.5m high) was proposed along the eastern end of Huddersfield Viaduct (MVL3/92) near to Hillhouse Lane Underbridge (MVL3/94). This was proposed as either king post wall or soil nailing. Following design iteration, soil nailing is planned in this area of existing embankment to the south of the railway (E0).
- 2.1.9 Earthworks (new and where they have been reworked) will generally be covered in topsoil and landscaped as appropriate. Any exceptions to this will be detailed within the Landscape and Ecological Management Plan (LEMP) Stage 8.
- 2.1.10 The Scheme impacts on various existing transmission and distribution utility networks. Conflicts with utility services may occur in Stage 4 where the Scheme crosses highways and. Works within the highway will be carried out in compliance with the Highways Agreement and any impacts on the highways network will be discussed through the Highway Network Management Group.

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<sup>1</sup> [Ch02 Scheme Description - Fig 2-1 Scheme drawings.pdf \(windows.net\)](#)

<sup>2</sup> [Ch02 Huddersfield - Scheme Description.pdf \(windows.net\)](#)

**Table 2-1 Works description**

Location	Structure/works	Summary description	Deemed Planning Drawing Title and Reference
Huddersfield Station	Passenger Footbridge	A covered footbridge (Huddersfield Station Footbridge (MVL3/91AA), with stairs and a lift, to be constructed to the eastern end of the station. This will provide step free access to the central platforms.	<ul style="list-style-type: none"> <li>• Footbridge - Proposed Elevations - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168053</a></li> <li>• Footbridge - Proposed Plan Deck Level - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168051</a></li> <li>• Footbridge - Proposed General Arrangement Platform Level - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168050</a></li> <li>• Footbridge - Proposed Roof Level General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168052</a></li> <li>• Footbridge - Proposed Sections - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168054</a></li> <li>• Existing and Proposed Long Sections (A-A) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168003</a></li> <li>• Existing and Proposed Long Sections (B-B) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168005</a></li> </ul>
Huddersfield Station	Passenger Subway	Extension to existing Subway (MVL3/91) (of 12.5m) required to service the new island platform to the north of the station.	<ul style="list-style-type: none"> <li>• Existing Plan and Sections - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168064</a></li> <li>• Proposed Plan and Section - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168065</a></li> </ul>
Huddersfield Station	Parcel Subway (MVL3/91A)	Utilising existing subway for utilities ducting and signalling equipment. Concrete infill.	<ul style="list-style-type: none"> <li>• Existing Plan and Sections - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168067</a></li> <li>• Proposed Plan and Section - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168068</a></li> </ul>
Huddersfield Station	Tearooms	Existing Tea Rooms - Timber structure to be carefully dismantled and relocated within island platform. To be dismantled and reconstructed.	<ul style="list-style-type: none"> <li>• Existing Floor Plan and Elevations - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168016</a></li> <li>• Existing and Proposed Elevations - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168015</a></li> <li>• Proposed Floor Plan and Elevations - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168017</a></li> </ul>
Huddersfield Station	Proposed Platforms	Works to railway lines including provision of new platforms and removal of existing railway sidings.	<ul style="list-style-type: none"> <li>• Existing Plan - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168060</a></li> <li>• Existing and Proposed Platform General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168001</a></li> <li>• Proposed Plan and Section - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168061</a></li> <li>• Proposed Plan and Section - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168062</a></li> <li>• Proposed Plan and Section - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168063</a></li> </ul>

Location	Structure/works	Summary description	Deemed Planning Drawing Title and Reference
Huddersfield Station	Canopy A	<p>Works to the main train shed within Huddersfield Station includes:</p> <ul style="list-style-type: none"> <li>• Structural works to maintain and strengthen;</li> <li>• Demolition of two canopy bays at Manchester end of the station;</li> <li>• Construction of two new bays at Leeds end;</li> <li>• Grit blasting of structure; and</li> <li>• Reinstatement of main train shed lantern.</li> </ul>	<ul style="list-style-type: none"> <li>• Existing and Proposed Roof General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-1680000</a></li> <li>• Existing and Proposed Short Sections (A-A) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168002</a></li> <li>• Existing and Proposed Short Sections (B-B) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168004</a></li> <li>• Existing Roof A Structural Plan (Roof Level) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168010</a>;</li> <li>• Existing Roof A Structural Sections Sheet (1) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168011</a></li> <li>• Existing Roof A Structural Sections Sheet (2) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168012</a>;</li> <li>• Existing Roof A OLE Support Details - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168013</a></li> </ul>
Huddersfield Station	Canopy B & C	<p>Canopy B&amp;C are to be demolished with new replacements to be constructed to cover platforms to north.</p>	<ul style="list-style-type: none"> <li>• Existing and Proposed Roof General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168000</a></li> <li>• Existing and Proposed Short Sections (A-A) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168002</a></li> <li>• Existing and Proposed Short Sections (B-B) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168004</a></li> <li>• Proposed Roof B (Shed Roof) Structural Plan (Roof Level) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168020</a></li> <li>• Proposed Roof B (Shed Roof) Structural Plan (Platform Level) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168021</a></li> <li>• Proposed Roof B (Shed Roof) Structural Sections (1) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168022</a></li> <li>• Proposed Roof B (Shed Roof) Structural Sections (2) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168023</a></li> <li>• Proposed Roof B (Shed Roof) Structural Sections (3) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168024</a></li> </ul>
Huddersfield Station	Platform free standing canopies	<p>Free standing canopies to be constructed over island platforms to eastern end of station.</p>	<ul style="list-style-type: none"> <li>• Existing and Proposed Roof General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168000</a></li> <li>• Proposed Platform General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168030</a></li> </ul>

Location	Structure/works	Summary description	Deemed Planning Drawing Title and Reference
			<ul style="list-style-type: none"> <li>Proposed Platform Canopies Elevation (1) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168034</a></li> <li>Proposed Platform Canopies Elevation (2) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168035</a></li> <li>Proposed Platform Canopies Structural Plan (Platform Level) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168031</a></li> <li>Proposed Platform Canopies Structural Sections - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168032</a></li> <li>Proposed Platform Canopies Structural Sections - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168033</a></li> </ul>
Huddersfield Station	Canopies – Penistone Line	Extension of Penistone Line canopies.	<ul style="list-style-type: none"> <li>Proposed Penistone Line Canopy Platform Level Plan General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168036</a></li> <li>Proposed Platform Penistone Canopies Structural Sections - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168037</a></li> <li>Proposed Platform Penistone Canopies Proposed Roof Covering Plans - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168038</a></li> <li>Proposed Platform Penistone Canopies Elevation (1) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168039</a></li> </ul>
Huddersfield Station	Relay Room	Existing relay room to be demolished.	<ul style="list-style-type: none"> <li>Existing and Proposed Platform General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168001</a></li> </ul>
Huddersfield Station	Drainage Works	Fitzwilliam Street sewer outfall (New) SE 1430 1707. Proposed new storm water drainage outfall for the re-modelled areas of Huddersfield Station. It will be a piped outfall from the drainage system, either directly into the sewer in the highway, or into an existing culvert within Network Rail land which connects into this sewer. A new manhole will be provided at the outfall.	<ul style="list-style-type: none"> <li>No relevant planning drawings</li> </ul>

Location	Structure/works	Summary description	Deemed Planning Drawing Title and Reference
Huddersfield Viaduct (MVL3/92)		Works across Huddersfield Viaduct includes general strengthening works along the length of viaduct together with localised repairs to arches where necessary. These works include pinning and grouting, shear anchors and spandrel strengthening with tie bar and pattress plates.	<ul style="list-style-type: none"> <li>Existing and Proposed East Elevation (Sheet 1) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168075</a></li> <li>Existing and Proposed East Elevation (Sheet 2) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168076</a></li> <li>Existing and Proposed East Elevation (Sheet 3) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168077</a></li> <li>Existing and Proposed East Elevation (Sheet 4) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168078</a></li> <li>Existing and Proposed East Elevation (Sheet 5) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168079</a></li> </ul>
Huddersfield Viaduct	Span 1 – John William Street Underbridge (MVL3/92(2))	The existing Span 1 bridge deck will be removed and replaced with a new single span bridge deck due to the current structural arrangement of the bridge clashing with the proposed track and platform works.	<ul style="list-style-type: none"> <li>Existing Plan and Proposed Plan (Sheet 1) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168070</a></li> <li>Existing Plan and Proposed Plan (Sheet 2) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168071</a></li> <li>Existing Plan and Proposed Plan (Sheet 3) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168072</a></li> </ul>
Huddersfield Viaduct	Span 4 – Fitzwilliam Street Underbridge (MVL3/92(3))	Substructure repairs including removal and reinstatement of the pier to the south-western corner of the structure. Strengthening to cross girders. Removal and replacement of parapet.	<ul style="list-style-type: none"> <li>Existing Plan and Proposed Plan (Sheet 4) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168073</a></li> <li>Existing Plan and Proposed Plan (Sheet 5) - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168074</a></li> <li>John William Street Bridge - Existing Highways General Arrangement - <a href="#">151667-TSA-30-MVL3-DRG-T-LP-168081</a></li> <li>John William Street Bridge - Proposed Highways General Arrangement - <a href="#">1667-TSA-30-MVL3-DRG-T-LP-168082</a></li> </ul>
Huddersfield Viaduct	Span 29 Bradford Road Underbridge (MVL3/92(9))	Existing bridge deck to be removed and replaced. Additional masonry pilasters/buttresses will be formed at the corners of the new abutments into which the concrete parapet will join. New concrete abutments to be built with stone facing in front of existing sandstone at both ends and, on both elevations.	

### 3. INFORMATION INCLUDED IN THIS SUBMISSION

3.1.1 The wording of Condition 5b(x) is reproduced in Table 3-1. Based on the scope of works detailed in Section 2, Table 3-1 sets out how this document details the information required in conjunction with Condition 5b(x).

**Table 3-1 Details of Condition 5b(x)**

Condition reference	Details of condition	Section reference
Condition 5b (Sub-section x)	<p>Part B of the CoCP (as defined in the Environmental Statement: Volume 3, Appendix 2-1 Code of Construction Practice (Part A), Section 1.2.5) must include the following plans and programmes, for each stage as defined in condition 3:-</p> <p>x. An Environmental Design Plan (EDP) (Land Contamination and Hydrogeology) – setting out the environmental requirements during the detailed design stage.</p>	Section 4

## 4. METHODOLOGY TO ACHIEVE MITIGATION MEASURES

### 4.1 Introduction

4.1.1 The Environmental Statement (ES) sets out the details of mitigation measures that would be included within the EDP. The mitigation measures relevant to Stage 4 are summarised as follows:

- Ground investigation will be undertaken as part of the detailed design phase to appraise/confirm the nature of geohazards and coal-related features; and, to assess the potential for adverse impacts to be realised.
- Geotechnical hazards will be assessed and the assessment of geotechnical risk and design decisions will be recorded in design statements and/or the geotechnical design reports. Dependent on the findings and where necessary, mitigation measures employed, which will include the use of ground improvement techniques and/or appropriate foundation/structure design.
- During the ongoing GI, monitoring wells have been/will be installed into boreholes drilled across the Huddersfield Station area in order to allow gas data to be collected from the contamination source or likely pathway (e.g. bedrock above shallow coal workings). Following completion of the monitoring programme (during the detailed design stage) the data will be used to refine the CSM and to undertake a risk assessment (pile types, if such is deemed necessary by the designers, will also be considered within the CSM and assessment).
- Following completion of the GI and risk assessment, if land contamination/gas hazards are considered to pose an unacceptable risk then a remediation options appraisal/strategy will be prepared, submitted to and agreed by the local authority pursuant to Condition 10 of the Deemed Planning Permission. Any required remediation must be carried out in accordance with the approved remediation strategy, with evidence collated for inclusion in a verification report to demonstrate the remediation has been completed. Where gas mitigation measures are required within new buildings the installation and verification must be undertaken in accordance with the guidance current at the time of construction.
- Piling works will be required for Stage 4 works. Piling risk assessments will be undertaken in general accordance with Environment Agency (EA) guidance, and where necessary implementation of piling techniques deemed appropriate to manage potential risks related to the creation of pathways to groundwater and/or ground gas or mine gas migration.

### 4.2 Further ground investigation and geohazard identification

4.2.1 The degree of risk posed by geohazards and coal mining features is dependent on a combination of the type of hazard, the site-specific ground conditions, the activities proposed and the likelihood they have to destabilise existing ground conditions sufficiently to result in a failure.

4.2.2 A comparison of the locations of the Stage 4 works against geohazard/coal mining maps obtained from the British Geological Survey (BGS) and The Coal Authority was undertaken as part of the Environmental Impact Assessment (EIA) presented within the ES. The EIA identified where a potential significant effect (considered Moderate or greater) might be present (refer to Table 12-14 of Chapter 12<sup>3</sup> (Geology, soils and land contamination) in

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<sup>3</sup> [Ch12 Geology, soil and land contamination.pdf \(windows.net\)](#)

Volume 2(i) of the ES).

4.2.3 Geohazards, probable shallow coal mine workings and mine entries have been, considered and mitigation measures proposed though Stage 3 works. No further works are required for Stage 4.

### 4.3 Land contamination/gas – potentially unacceptable risks

- 4.3.1 The TRU West Alliance has a responsibility to minimise/avoid the potential for mobilising existing ground contaminants and/or creating new contaminant migration pathways that might create an unacceptable risk to human health and the environment.
- 4.3.2 It is anticipated that potentially unacceptable risks are likely to be limited to those locations where substantial contamination sources (e.g. fuel/chemical storage, landfill) coincide with ground disturbance, e.g. stripping near surfaces soils, removal of existing hardstanding, excavations to create access ramps or temporary service trenches.
- 4.3.3 A land contamination/gas risk assessment (LCRA) that considers the permanent works at Huddersfield Station has been undertaken (document ref: 151667-TSA-00-TRU-REP-W-EN-001347) and submitted in relation to Condition 10 of the Deemed Planning Permission (Stage 4).
- 4.3.4 The report has been prepared in general accordance with the EA's Land Contamination Risk Management guidance (LCRM 2020) which cross references to other applicable guidance documents.
- 4.3.5 Based on the proposed Stage 4 works, the following risks have been identified:
- Ground gas risks
- 4.3.6 Despite the relatively low concentrations of carbon dioxide and methane, the low flow readings and the low risk characteristic situation for the site as a whole there is still considered to be a potential risk from coal mining gas migrating into confined spaces.
- 4.3.7 Mitigation measures for a CS2 level of risk will be required for the proposed development based on BS8485:2015+A1:2019 (27). This represents a precautionary upgrade from CS1.
- 4.3.8 BS8485 has been considered during the design of the proposed lift shafts, motor rooms and subway and appropriate gas protective measures incorporated into the design.
- 4.3.9 The residual risk to construction workers from the accumulation of ground gases within excavations shall be managed by good site practices. Where possible, entering confined spaces should be avoided. Where confined spaces need to be entered, work method statements and risk assessments should be implemented, and the confined spaces working protocol shall be employed where necessary (32).
- 4.3.10 There are no significant risks to human health as hardstanding will be present across all of the site areas accessible to the public, there is not considered to be a significant linkage between onsite soils and future site users. No reuse of excavated material is proposed.
- 4.3.11 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.

## 4.4 Piling risk assessment

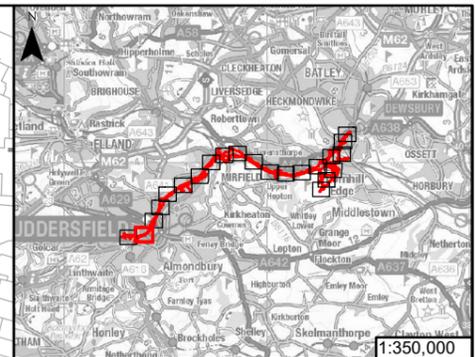
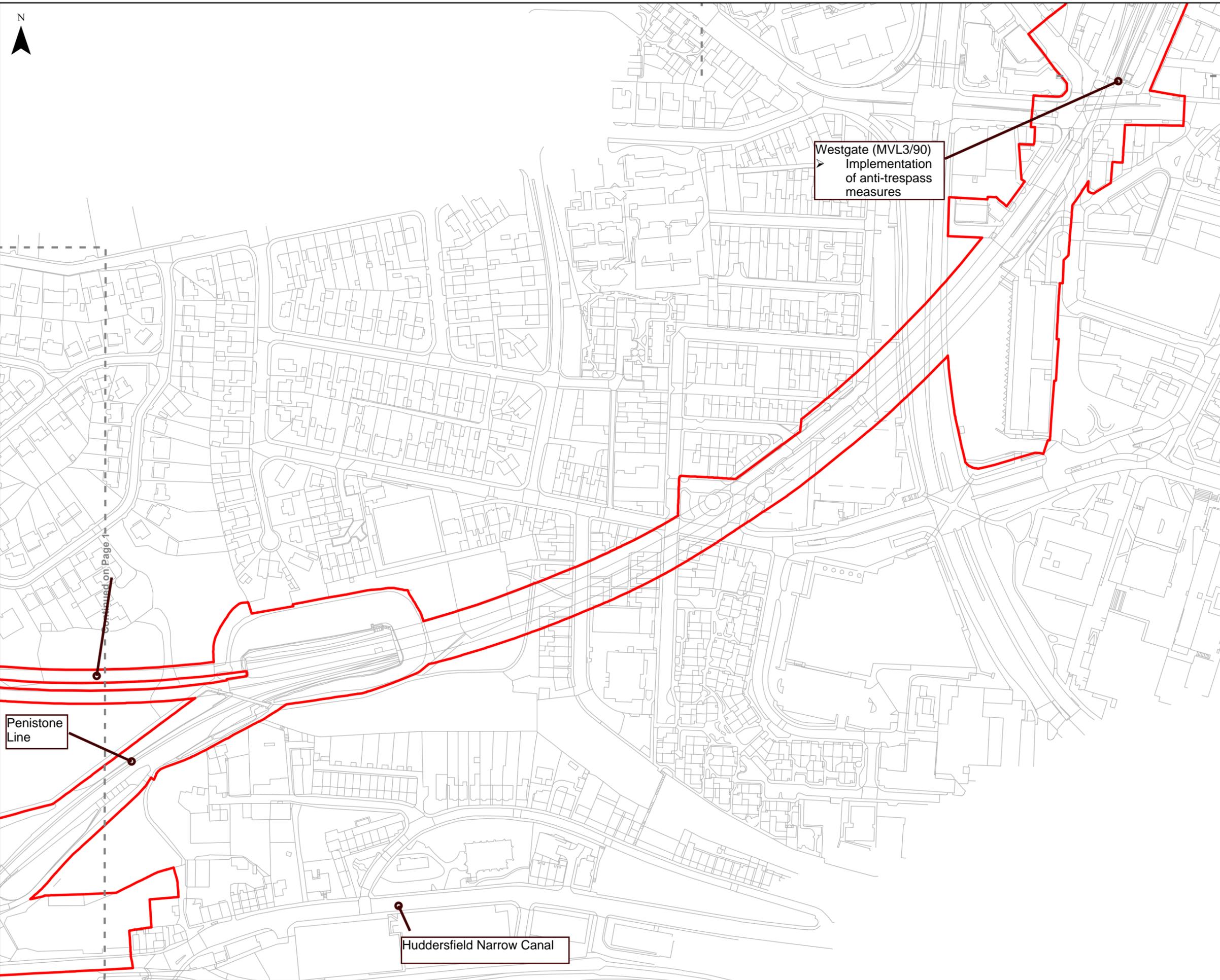
4.4.1 Piling will be required for the following Stage 4 works:

- Huddersfield Station:
  - Construction of replacement Canopy B & C
  - Construction of Footbridge and associated lift shafts
  - Construction of staircase on island platform
- Huddersfield Viaduct:
  - Span 29

4.4.2 Piling risk assessments have been undertaken and are included at Appendix B and C respectively.

# Appendices

## **APPENDIX A – STAGE 4 WORKS LOCATION PLAN**



Scheme Boundary  
 Adjacent Map Sheet



P01	12/02/21	FIRST ISSUE	RB	PB	PB
Rev	Date	Description of Revisions	Drwn	Chkd	Appr
Status					Suitability
<b>SHARED</b>					



Project  
**TRANSPENNINE ROUTE UPGRADE**  
 Contract No.  
**151667**  
 Scheme Title  
**THE NETWORK RAIL (HUDDERSFIELD TO WESTTOWN (DEWSBURY) IMPROVEMENTS) ORDER**

Drawing Title  

### Figure 1

#### Stage 4 works

Designed	R.Bowes	Signed Electronically	Date	12/02/2021
Drawn	R.Bowes	Signed Electronically	Date	12/02/2021
Checked	P.Butler	Signed Electronically	Date	12/02/2021
Approved	P.Butler	Signed Electronically	Date	12/02/2021

Scale(s)  
 1:2,500  
 ELR & Project Chainage  
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Alternative Reference  
 ---  
 Sheet  
 2 of 22

Drawing Number  
 151667-TSA-00-TRU-REP-W-EN-001370  
 Revision  
 P01.1

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**Railway works include**

- 4 tracking
- Horizontal track realignment
- Relaying of ballast and tracks

Continued on Page 4

**Halfords - access to business to be maintained**

**Huddersfield Viaduct (MVL3/92) Bradford Road**

- Existing bridge deck to be removed and replaced
- Additional masonry pilasters/butresses will be formed at the corners of the new abutments into which the concrete parapet will join.
- New concrete abutments to be built with stone facing in front of existing sandstone at both ends and, on both elevations.

**Huddersfield Viaduct – Span 4 – Fitzwilliam Street Underbridge**

- Substructure repairs including removal and reinstatement of the pier to the south-western corner of the structure
- Strengthening to cross girders
- Removal of parapet and replacement with replica in cast iron

**Huddersfield Viaduct - general strengthening works along the length of viaduct together with localised repairs to arches where necessary. These works include pinning and grouting, shear anchors and spandrel strengthening with tie bar and pattress plates.**

**DNO - Fitzwilliam Street**

**Huddersfield Viaduct Span 1 (MVL3/929 (1)) - John William Street**

- existing bridge deck will be removed and replaced with a new single span bridge deck

**Fitzwilliam Street Construction Compound**

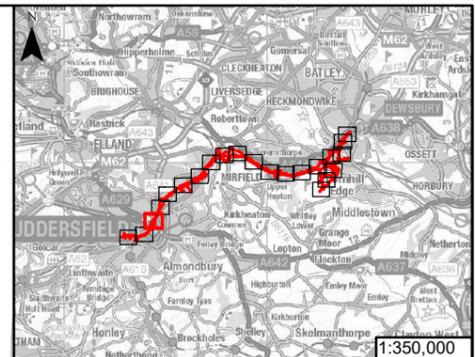
**Huddersfield Station - construction compound**

**Brian Jackson House**

**Huddersfield Station**

- main train shed - structural works, two bays at Manchester end of canopy to be demolished, two new bays at Leeds end of platform 1; reinstatement of main train shed lantern;
- smaller train shed (canopies B&C) to be demolished, new roof to be constructed;
- free standing canopies over island platforms
- extension to canopy to service Penistone line;
- tea rooms to be deconstructed and relocated;
- a covered footbridge (with lift and stairs) to be constructed (step free access)
- concrete infill of existing parcel subway
- extension to existing passenger subway to service new island platform to north of station
- Grit blasting of main train shed
- Works to railway lines including provision of new platforms and removal of existing railway sidings
- Demolition of existing relay room

Continued on Page 2



Scheme Boundary  
 Adjacent Map Sheet



P01	12/02/21	FIRST ISSUE	RB	PB	PB
Rev	Date	Description of Revisions	Drwn	Chkd	Appr
Status	<b>SHARED</b>				Suitability



Project  
**TRANSPENNINE ROUTE UPGRADE**

Contract No.  
**151667**

Scheme Title  
**THE NETWORK RAIL (HUDDERSFIELD TO WESTTOWN (DEWSBURY) IMPROVEMENTS) ORDER**

Drawing Title  
**Figure 1  
Stage 4 works**

Designed	R.Bowes	Signed Electronically	Date	12/02/2021
Drawn	R.Bowes	Signed Electronically	Date	12/02/2021
Checked	P.Butler	Signed Electronically	Date	12/02/2021
Approved	P.Butler	Signed Electronically	Date	12/02/2021

Scale(s)  
1:2,500

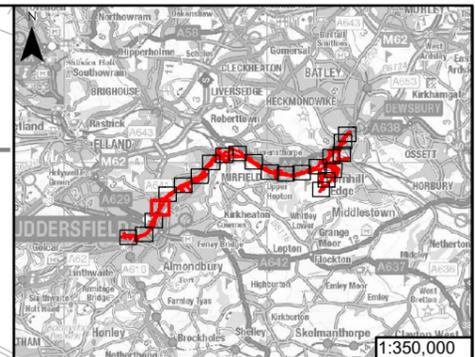
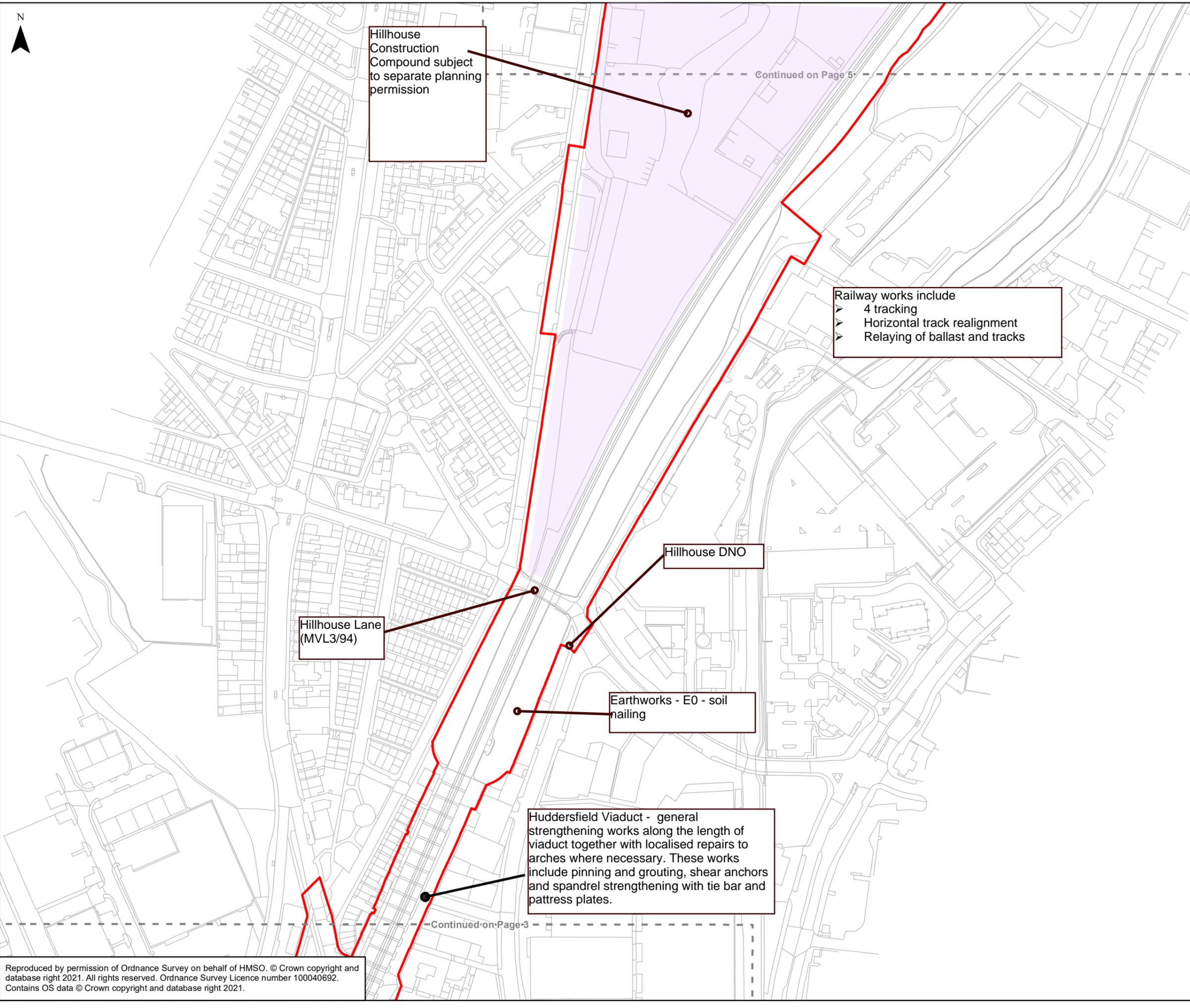
ELR & Project Chainage  
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Alternative Reference  
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Sheet  
3 of 22

Drawing Number  
151667-TSA-00-REP-W-EN-001370

Revision  
P01.1



- Scheme Boundary
- Adjacent Map Sheet

Railway works include

- 4 tracking
- Horizontal track realignment
- Relaying of ballast and tracks



P01	12/02/21	FIRST ISSUE	RB	PB	PB
Rev	Date	Description of Revisions	Drwn	Chkd	Appr
Status					Suitability
<b>SHARED</b>					



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Scale(s)  
1:2,500

ELR & Project Chainage  
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Alternative Reference  
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Sheet  
4 of 22

Drawing Number  
151667-TSA-00-TRU-REP-W-EN-001370

Revision  
P01.1

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## **APPENDIX B – PILING RISK ASSESSMENT – HUDDERSFIELD STATION**

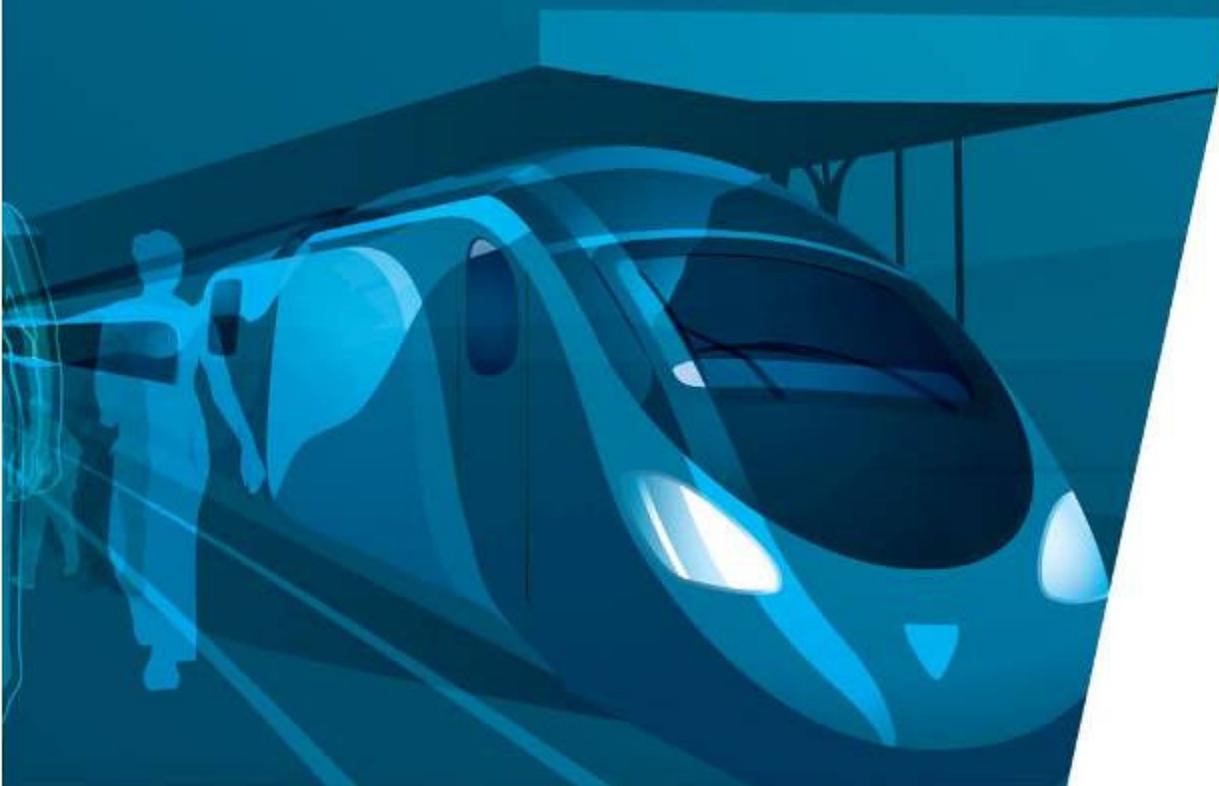
**NetworkRail**

# Huddersfield Station

## Piling Risk Assessment

Network Rail

June 2023



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## 1. INTRODUCTION

### 1.1. Scheme Background

- 1.1.1 The Transpennine Route Upgrade Programme (TRU) 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.

### 1.2 Objectives

- 1.2.1 The objective of this report is to assess the potential risk to controlled waters associated with the proposed piling activities that are to be undertaken at Huddersfield Station (the “site”). This piling risk assessment (PRA) was undertaken in line with relevant Environment Agency (EA) guidance (1) (2) and should be read in conjunction with the 2023 Phase 2 Risk Assessment (RA) (3).

### 1.3 Information sources

- 1.3.1 The following sources of information have been used in this report:

- Transpire Alliance, Huddersfield Station Phase 2 Land Contamination Risk Assessment, 2023 (3)
- Network Rail, Environment Statement Volume 2ii: Huddersfield, 2019 (4). Groundsure, Enviro Insight report and Historical Mapping, 2019 (5).
- Transpire Alliance, W3 - GEO - Mining Risk Mitigation Remit: Report, 151667-TSA-W3-000-REP-W-GE-030510 A01, May 2022 (6).
- Structural Soils Ltd, Factual Report on Ground Investigation W3-MVL3-GRIP4- Huddersfield Viaduct and Station Survey Report, 2022 (7).
- Zetica UXO online risk mapping (8).

### 1.4 Limitations

- 1.4.1 The report authors are responsible for selecting and summarising the data supplied by third parties but cannot be held responsible for any mistakes or inaccuracies or the completeness of third-party data on which it has relied. 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. Therefore, this report cannot guarantee against unexpected ground conditions occurring between the sampling points.
- 1.4.2 Constraints relating to geotechnical hazards, ecology, heritage, flooding/drainage, utilities, air quality and noise are beyond the remit of this report.
- 1.4.3 The report has been prepared using all chemical testing and monitoring data identified and available at the time of writing. The data used in this report is recorded within factual reports provided by contractors. The ground investigations were combined geotechnical and geo-environmental investigations, and environmental sampling was not undertaken at all locations.
- 1.4.4 Ground gas and groundwater conditions are based on observations made at the time of the ground investigations and monitoring programmes, and may be subject to variation due to atmospheric, seasonal or other effects.

- 1.4.5 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.
- 1.4.6 This report does not advise on measures to manage risks associated with asbestos, where present. Detailed advice should be sought from a specialist contractor.

## 2. THE DEVELOPMENT

### 2.1 Site location

- 2.1.1 The site is located at Huddersfield Station, St. George Square, Huddersfield, centred on 414341E, 416900N between TRU chainages A:41290 and A:41660. The site is at an approximate elevation of 88 m above ordnance datum (m AOD).
- 2.1.2 The Huddersfield Station project site encompasses an area of approximately 2.2 hectares (ha), which is entirely under the ownership of Network Rail. The site is operational railway land as defined by Section 263 of the Town and Country Planning Act 1990 (9).

### 2.2 Proposed development

- 2.2.1 The proposed development comprises the upgrade of the station as part of wider TRU works. Full details of the development are presented in the Phase 2 RA (3).
- 2.2.2 At the time of writing the piling design is still ongoing. Proposed piling activities include 70No. 450 millimetre (mm) rotary core bored piles to depths between 11.5 and 15.0 metres below ground level (m bgl) and 38No. bored piles installed as a contiguous wall to 15 m bgl. Proposed piling is presented on the following drawings, appended in Appendix A:
- 151667-TSA-30-MVL3-DRG-S-ST-180002 B02, 2023;
  - 151667-TSA-30-MVL3-DRG-S-ST-180010 B02, 2023;
  - 151667-TSA-30-MVL3-DRG-S-ST-172900 Sheet 1 + 2, 2023.
- 2.2.3 No figure is available for the contiguous wall at the time of writing this report though it is understood to be located at "MVL3/91a" with 450 mm piles at 15 m depth

### 3. SITE CHARACTERISTICS

#### 3.1 Site characteristics

- 3.1.1 A summary of the historical and environmental setting of the site is presented in the Phase 2 RA (3) along with a summary of recent GI and assessment of environmental site conditions.
- 3.1.2 Mining risk is assessed and remedial options presented for the site and surrounding area of the scheme in the 2022 Mining Risk Mitigation Remit Report (6). The risk assessment and required mitigation for the site are summarised in the 2023 Phase 2 RA (3). The report identified mine entries are recorded within 250 m of the site and grouting of voids was recommended beneath the site.
- 3.1.3 Pertinent information from source documents is summarised within this PRA assessment, Table 5-1.

### 4. PROPOSED PILING TECHNIQUE

- 4.1.1 Piling activity is currently proposed to include 108No. rotary bored piles to a maximum depth of 15.0 m bgl. The piles will terminate within the Pennine Lower Coal Measures at between approximately 73.0 and 76.5 m AOD.
- 4.1.2 The proposed method for piling activities at the site, rotary boring, is a non-displacement piling method with excavated soil removed as arisings and then piles cast in-situ within the ground. This method ensures materials are not pushed downwards through differing lithologies, protecting underlying groundwater from potential contaminants.
- 4.1.3 Groundwater level at the site varies between approximately 0.8 m bgl and 7.3 m bgl. As such the proposed piling activity will interact with groundwater beneath the site. Full details of groundwater monitoring are presented in the Phase 2 RA (3).

### 5. PILING RISK ASSESSMENT

#### 5.1 Methodology

- 5.1.1 The PRA has been completed according to the methodology and framework set out in the EA guidance on piling on contaminated land (1).
- 5.1.2 This guidance sets out the following six pollution scenarios (PS) that may occur during piling operations on potentially contaminated sites. A seventh risk scenario (RS) has been added due to one of the proposed piling methods to be used at the site:
- PS1 - Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an aquifer;
  - PS2 - Creation of preferential pathways through a low permeability surface layer, allowing migration of soil gas, coal seam gas or contaminant vapours to the surface;
  - PS3 - Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface;
  - PS4 - Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of materials;
  - PS5 - The pushing of contaminants down into an aquifer during pile driving;

- PS6 - Contamination of groundwater and subsequently surface waters by wet concrete, cement paste or grout; and,
- RS7 - Impediment of groundwater flow resulting in groundwater mounding.

5.1.3 For piling works, risks to environmental receptors are likely to be greater when:

- Contaminants are present on the site and ground works could allow them to migrate;
- Piling would breach a low permeability layer or connect two previously discrete aquifers;
- The site overlies a principal or secondary A aquifer;
- The site is located within a groundwater source protection zone (SPZ);
- The groundwater table is shallow or likely to be intersected by piles;
- The geological strata are fractured or fissured;
- Works are close to a surface water body and run-off from arisings could pollute those waters.

5.1.4 The following section provides a summary of the likelihood and magnitude of potential risks associated with the proposed rotary bored piling against the pollution and risk scenarios that have been identified. As part of this assessment, it has been assumed that mitigation measures during piling, good working practices and adherence to design guidance will be incorporated in the piling design and construction process.

5.1.5 The risk assessment is presented in Table 5-1.

## 5.2 Piling Scenario Assessment

5.2.1 Table 5-1 presents site specific considerations, overall risk and possible mitigation measures for each the identified pollution / risk scenario using bored piling.

**Table 5-1 - Summary of pollution / risk scenarios for piling activities under current site conditions**

Pollution / Risk Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
<p>No. 1 Creation of preferential pathway through aquitard</p>	<ul style="list-style-type: none"> <li>• Geology at the site consists of Made Ground underlain by superficial deposits of Head (secondary undifferentiated aquifer) and bedrock of Pennine Lower Coal Measures Formation (secondary A aquifer).</li> <li>• Identification of concentrations of total petroleum hydrocarbons (TPHs) and polycyclic aromatic hydrocarbons (PAHs) above laboratory detection limit identified in soils samples.</li> <li>• The Head is unlikely to act as a consistent aquitard due to its heterogeneity (clayey to gravelly).</li> <li>• Piling methods potentially involve creation of preferential pathways into an underlying secondary A aquifer.</li> <li>• Any pathway created by bored piles is temporary while the pile is installed and grouted. Once grouted the pathway is no longer present.</li> <li>• Groundwater at the site has a low/moderate environmental sensitivity. The site is not within a source protection zone.</li> <li>• No surface water features are located within 250 m of the site.</li> </ul>	<p>Low/Moderate</p>	<ul style="list-style-type: none"> <li>• Use casing and aquifer protection measures during drilling (e.g. telescopic drilling) to inhibit downward migration of identified concentrations of organics through low permeability layers.</li> <li>• Grout/concrete the hole as soon as practicable to close any potential pathway.</li> <li>• Good workmanship during construction of the hole to ensure hole does not collapse.</li> <li>• Watch and brief approach. Monitor composition of arisings. Seek advice if visual or olfactory evidence of contamination is identified.</li> </ul>

Pollution / Risk Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
<p>No. 2 Creation of preferential pathway through low permeability surface layer, allowing migration of soil gas, coal seam gas or contaminant vapours to the surface</p>	<ul style="list-style-type: none"> <li>• Source material (Made Ground) present at the site. Potential for volatilisation of identified organic determinands. Gas risk assessment reported low risk at the site (3).</li> <li>• Potential for collection of gases and vapours from Made Ground capped by hard standing at site. Potential for release of gases and vapours when hard standing compromised.</li> <li>• The site is generally open so hazardous gas are unlikely to be able to accumulate.</li> <li>• Potential for hazardous ground gas release when working near coal bearing strata.</li> <li>• Migration of hazardous gases associated with coal workings will be restricted as mineworking at the site will be grouted prior to piling works (6).</li> <li>• Any pathway created by rotary bored piling is temporary while the pile is installed and grouted. Once grouted the pathway is no longer present.</li> </ul>	<p>Low/Moderate (during construction); Low (during operation)</p>	<ul style="list-style-type: none"> <li>• Take due consideration of risk and assess accordingly. Contractors to provide mitigation for employees as required, e.g. use of gas alarms.</li> </ul>
<p>No. 3 Direct contact of site workers with contaminated arisings</p>	<ul style="list-style-type: none"> <li>• No exceedances of screening of soil samples against commercial screening criteria (3). Concentrations of PAH, TPH and metals above laboratory detection limit from samples of Made Ground material taken during GI works.</li> <li>• Proposed piling does not displace material and creates arisings. This material is brought to surface and will interact with site workers and has the potential for run-off to nearby drains.</li> </ul>	<p>Low/Moderate</p>	<ul style="list-style-type: none"> <li>• Contractors to be made aware of potential for contamination to be present in Made Ground so that appropriate health and safety measures (e.g. use of personal protection equipment) can be implemented.</li> <li>• Although not confirmed, presence of asbestos cannot be discounted in Made</li> </ul>

Pollution / Risk Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
			<p>Ground. Therefore, any personnel working with the Made Ground material should have appropriate training and work under applicable risk assessment prior to the works being undertaken.</p> <ul style="list-style-type: none"> <li>• Ensure no over-rotation of augers, if used within excavation.</li> <li>• It is assumed that all arisings will be removed from the site. The arisings should be appropriately classified and treated/ disposed off-site at a suitable waste management facility. If arisings are to be re-used on site then they must be assessed appropriately under relevant a material management plan.</li> </ul>
<p>No. 4 Direct contact of the piles with contaminated soil or leachate</p>	<ul style="list-style-type: none"> <li>• Proposed locations will penetrate Made Ground, Head and intersect bedrock. Contact between piles and groundwater is likely.</li> <li>• Laboratory analysis has shown there to be concentrations of determinands above laboratory detection limit across the site, including organic determinands. Screening of leachate and groundwater data indicates exceedances of the Drinking Water Standards (DWS).</li> </ul>	<p>Low/Moderate</p>	<ul style="list-style-type: none"> <li>• Contractors to be made aware of potential for aggressive ground conditions or groundwater.</li> <li>• Classification of ground conditions to be undertaken by the piling design team. Appropriate material grade for piling are to be selected based</li> </ul>

Pollution / Risk Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
	<ul style="list-style-type: none"> <li>Ground aggressivity has not been assessed.</li> </ul>		<p>on the ground conditions and aggressivity following appropriate guidance/legislation.</p>
<p>No. 5 Pushing solid contamination down into an aquifer</p>	<ul style="list-style-type: none"> <li>By using a bored piling technique material should not be pushed downwards. Non-displacement (bored) piles will remove soil to the surface and therefore do not result in contaminated soils being pushed either laterally or downward into the underlying bedrock.</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>Consideration should be given to use of aquifer protection measures during drilling (e.g. telescopic drilling).</li> <li>Ensure no under-rotation of augers, if used within excavation.</li> </ul>
<p>No. 6 Contamination of groundwater by wet concrete or grout</p>	<ul style="list-style-type: none"> <li>Non-displacement (bored) piles require either (or a combination of) concrete, cement paste or grout to be introduced into the ground. This may result in the loss of wet concrete, cement paste or grout in groundwater, associated with fractured/jointed rocks or areas of unidentified worked coal seams. If retardant additives are used, pile materials could take several hours to set.</li> <li>Pile depth is expected to penetrate the top of the secondary A Pennine Lower Coal Measures aquifer.</li> <li>Historical mine workings have been identified in the immediate vicinity of the site. However, as per mining risk assessment, these will be grouted prior to piling works at the site, further reducing the likelihood of migration of wet concrete or grout.</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>A high slump concrete mix is recommended to be utilised within the bore reducing the risk of potentially contaminating the groundwater in the secondary A aquifer or surface water in the nearby river.</li> <li>Careful monitoring of grouting rates and total volume used, compared to predicted volumes to provide an early indication of potential migration.</li> </ul>

Pollution / Risk Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
	<ul style="list-style-type: none"> <li>No surface water features within 250 m of the site.</li> </ul>		
<p>No. 7 Impediment of groundwater flow creating groundwater mounding</p>	<ul style="list-style-type: none"> <li>Proposed spacing between bored piles, as per the design, is unlikely to impact groundwater flow, with sufficient space between piles to allow for groundwater to continue to flow. Proposed design provides adequate spacing between piles.</li> <li>Contiguous wall piling maintains gap between piles and so is also unlikely to impact groundwater flow.</li> <li>Grouting of mining voids may impact groundwater and reduce hydraulic conductivity of strata in the vicinity of the site prior to piling which means piling activities should not decrease the permeability of the overall aquifer.</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>Bored piles - No specific mitigation measures</li> <li>Contiguous wall - Development of an action plan with steps to follow upon identification of unacceptable changes to groundwater elevation.</li> </ul>

## 6. SUMMARY AND RECOMMENDATIONS

### 6.1 Summary

- 6.1.1 A piling risk assessment has been undertaken for the proposed works at Huddersfield Station. The risk assessment was completed based on design available at the time of writing but final designs were not available. Based on the available designs, the piling work is expected to extend to an elevation of between approximately 73.0 and 76.5 m AOD.
- 6.1.2 The assessment has been reviewed based on proposed bored piles, a non-displacement piling method. The identified depth to groundwater suggests that all piles are expected to intersect groundwater and terminate in the bedrock of the Pennine Lower Coal Measures Formation (secondary A aquifer).
- 6.1.3 Concentrations of inorganic and organic determinands above laboratory detection limit were reported in soil samples collected at the site. Screening against generic assessment criteria reported no exceedances against relevant commercial human health criteria. Samples of soil-leachate and groundwater reported multiple exceedances against drinking water standards (full results in the Phase 2 RA).
- 6.1.4 The site lies within a surface coal resource area, a development high risk area and a probable shallow coal mine working area. Mine entries are recorded within 250 m of the site. The proposed piling activity will interact with the Pennine Lower Coal Measures, potentially including a coal seam. The Mining Risk Assessment Report reported that the site was high risk and recommended mitigation measures, including grouting of mining voids.
- 6.1.5 The piling options discussed above are subject to appropriate workmanship, mitigation and ensuring QA/QC measures are adopted. The piling works should also be subject to appropriate oversight and method statements. Should the proposed depths or techniques of piling be changed then this assessment should be reviewed.
- 6.1.6 Based on the assessment undertaken, the risk rating for bored piles was low to moderate for all pollution and risk scenarios.
- 6.1.7 There was a low/moderate risk for PS1 and PS2, creation of preferential pathways and gas migration due to the presence of concentrations of organic determinands in excess of the laboratory detection limit in areas of proposed piling work and the associated potential generation of vapours.
- 6.1.8 The low/moderate risk associated with PS3 can be managed with appropriate health and safety measures for site workers and suitable storage and disposal of arisings under appropriate duty of care or in line with an applicable materials management plan. The risks associated with PS1 and PS2 can be mitigated by use of casing and aquifer protection measures during drilling (e.g. telescopic drilling) to inhibit downward migration of identified contamination through low permeability layers and use of suitable gas alarms and appropriate health and safety measures.
- 6.1.9 Aggressivity of ground has not been determined and so the risk from PS4 requires classification of potential aggressive ground conditions by the piling designer. Any identified aggressive conditions can be mitigated by use of appropriate pile materials to the identified conditions. The risk from PS6 (contamination of groundwater by wet concrete or grout) can be mitigated by use of a high slump concrete mix in the piles and monitoring of grouting rates/comparison to calculated volumes throughout piling.
- 6.1.10 The risks associated with PS5 are low as rotary bored piles are non-displacement and

material will be removed to the surface rather than pushed downwards. The risks associated with RS7, groundwater mounding, are considered low due to the proposed piling design and mine void grouting that will be occurring prior to piling at the site.

## 6.2 Recommendations

- 6.2.1 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).
- 6.2.2 Use aquifer protection measures during drilling (e.g. telescopic drilling) to inhibit downward migration of identified concentrations of determinands through low permeability layers.
- 6.2.3 Ensure good workmanship during construction to ensure the hole does not collapse and soil does not migrate vertically into the underlying secondary A aquifer.
- 6.2.4 The addition of grout/concrete as soon as practicable after drilling to quickly close any potential pathway;
- 6.2.5 Elevated hazardous ground gas was not identified. However, due consideration of risk and reasonable mitigation e.g. use of gas alarms, is recommended.
- 6.2.6 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.
- 6.2.7 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 (10).
- 6.2.8 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.
- 6.2.9 Ensure no under-rotation of augers (if used within excavation) to prevent material being pushed downwards into the aquifer.

## 7. REFERENCES

1. **Environment Agency.** *Piling and Penetrative Ground Improvement Method on Land Affected by Contamination: Guidance on Pollution Prevention. National Groundwater and Contaminated Land Centre report NC/99/73.* s.l. : Environment Agency, 2001.
2. **Environment Agency .** *Piling in layered ground: risks to groundwater and archaeology.* s.l. : Environment Agency, 2006.
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6. **Transpire Alliance.** *Mining Risk Mitigation Remit: Report.* 2022. 151667-TSA-W3-000-REP-W-GE-030510 A01.
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8. **ZeticaUXO.** Zetica UXO risk maps. *Zetica UXO.* [Online] 2023. [Cited: 08 06 2023.] <https://zeticauxo.com/downloads-and-resources/risk-maps/>.
9. **UK Statutory Instruments.** *Town and Country Planning Act .* 1990.
10. **BRE Construction Division.** *BRE Special Digest 1 - Concrete in aggressive ground.* s.l. : BRE, 2005.

## APPENDIX A – FIGURES AND DRAWINGS



**Safety, Health and Environmental Information**  
For Health and Safety Information, refer to discipline specific Project Hazard Record. (151667-TSA-30-MVL3-REG-W-ST-180000)

	Undermining existing Roof A foundations (to remain in situ column adjacent to new roof). CDM-W3-G4-0422		Existing redundant foundations in the ground from previous roof structure. CDM-W3-G5-1673
	Damage / inconvenience to Principal Building. CDM-W3-G5-1718		Existing buried services within the platform structure clashes with the roof extension foundations. CDM-W3-G5-1676

**Legend/Notes**

**Legend**

- Existing (Green line)
- To be Removed (Red line)
- Proposed (Blue line)

Note: Elements in grey shown for context only. Refer to relevant drawings for information relating to these elements.

GPR surveys complete. Elimination to be achieved by identifying the position of these assets before foundation installation through trial pits and CAT scan.

During works, the existing ducts are to be removed, and temporary lighting and PA system put in place if required.

All construction activities that involve breaking ground to be managed in accordance with HSG47 and NR/L2/AMG/1030, with exploratory trial holes as appropriate. All excavations to be CAT scanned every 300mm of dig and any services identified are to be marked up, diverted or protected as appropriate in accordance with NR/L2/AMG/1030.

- Notes**
- All dimensions are in millimetres, all levels are in metres unless stated otherwise.
  - Do not scale from this drawing.
  - Refer to drawing 151667-TSA-30-MVL3-DRG-S-ST-180000 for General Notes.
  - In constructing or maintaining the Works identified as Scheduled Works in Schedule 1 of the Network Rail (Huddersfield to West Town (Dewsbury) Improvements Order, Network Rail may deviate from the dimensions shown on this drawing to the extent permitted by the Order.

**Key Plan**

SCALE 1:200

THE NETWORK RAIL (HUDDERSFIELD TO WEST TOWN (DEWSBURY) IMPROVEMENTS) ORDER

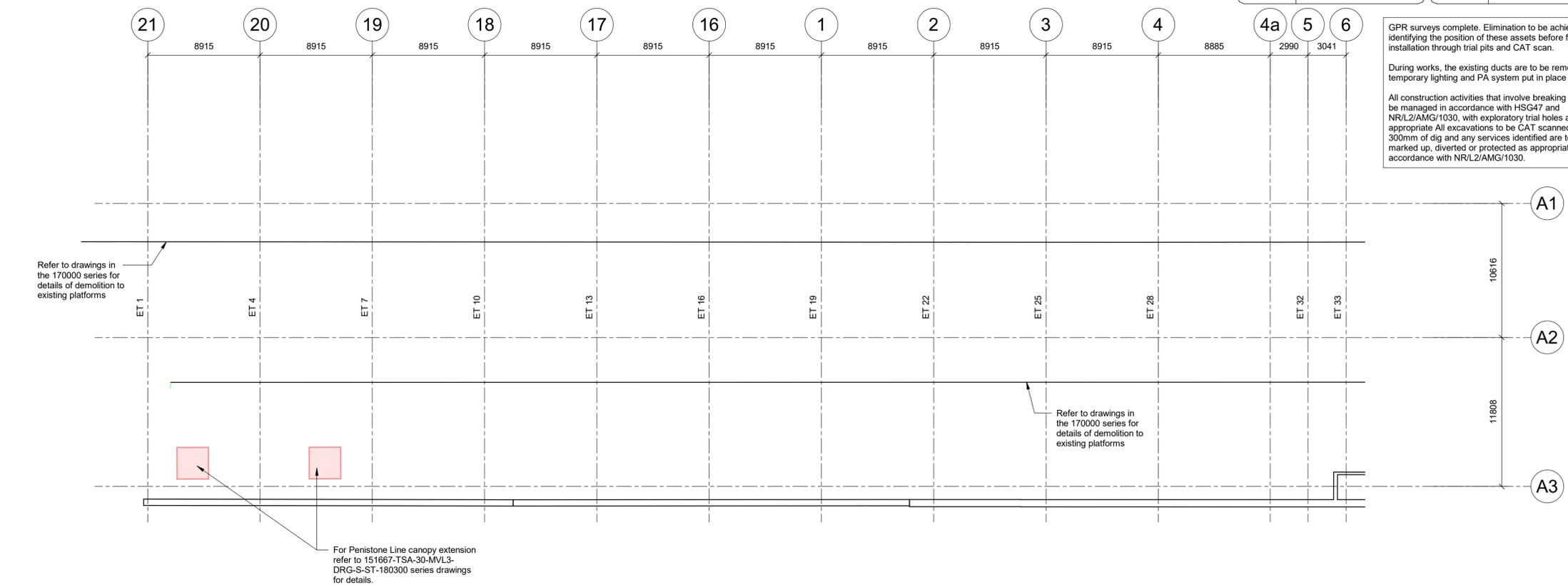
Rev	Date	Description of Revisions	Drawn	Chkd	Appr	Suitability
B01	08/12/22	Issued for F003 approval				JP
B02	05/06/23	Issued for ???				JP

Status: **Fit for Internal Review and Comment** S3

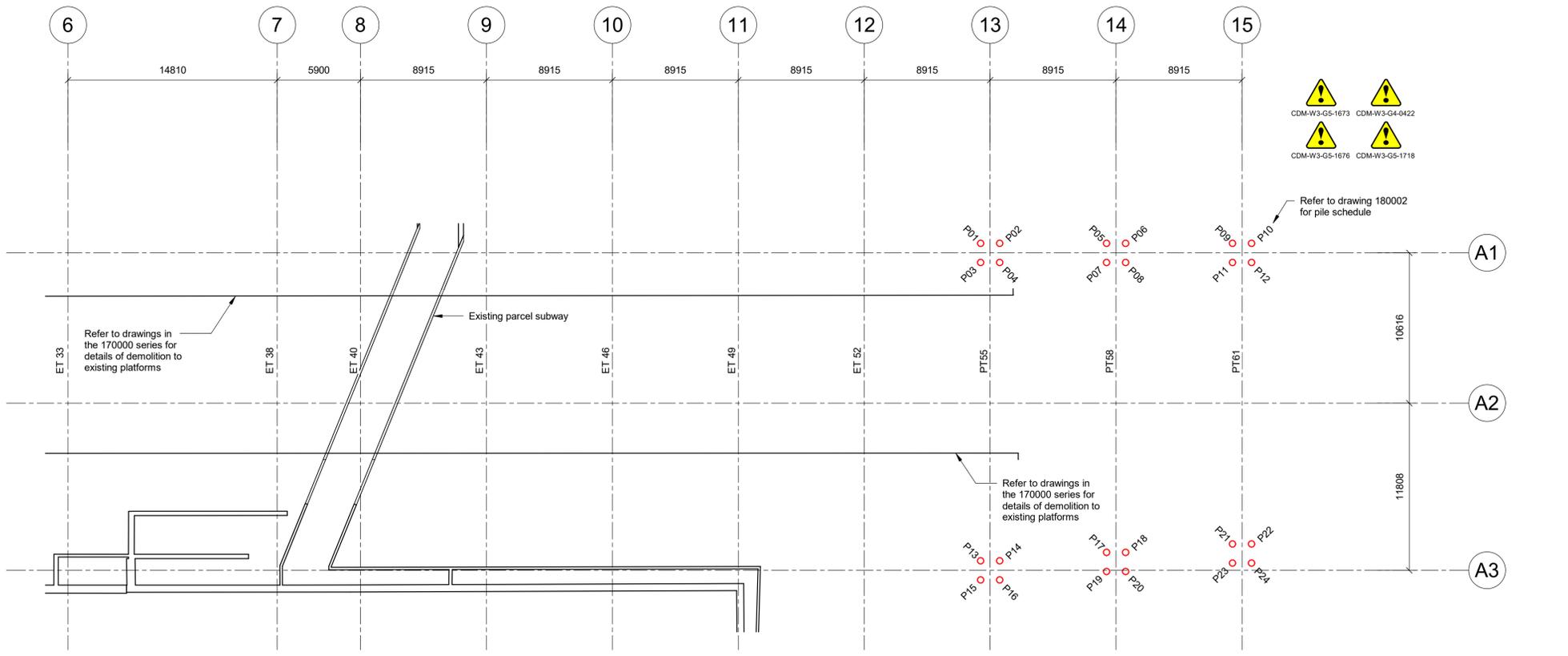


Authorised	Signed	Date
Contractor(s) <b>TRU - West Alliance</b>		
Location/Level STALYBRIDGE STN - HEATON LODGE JN (HUDD-MANC LINE)		
Type	Sub-Type	
CAD Drawing	Plan	
Role	Sub-Role	
Structural	Structures and Buildings	
Zone	Huddersfield	
Phasing	Grip Stage	5
Project <b>Transpennine Route Upgrade</b>		
Contract no. <b>151667</b>		
Contract Title <b>TRU - West of Leeds</b>		
Drawing Title <b>W3 - 30 - Huddersfield Station Roof A Structural Plan - Pile Level Sheet 1 of 1</b>		

Designed	S. Rai	Signed		Date	05/06/23
Drawn	D. Parker	Signed		Date	05/06/23
Checked	G. Lunardi	Signed		Date	05/06/23
Approved	J. Portlock	Signed		Date	05/06/23
Scale(s)	As indicated				
Alternative Reference	ELR & Mileage 25.1188 to 25.1428				
Drawing Number <b>151667-TSA-30-MVL3-DRG-S-ST-180010</b>					Sheet <b>1 of 1</b>
Revision <b>B02</b>					



**1 Roof A - Pile Level**  
1:200

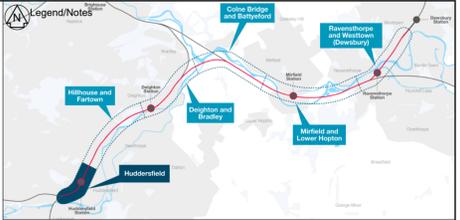


**2 Roof A - Pile Level**  
1:200

Roof A Piling Schedule

Zone	Mark	Type	Pile Diameter (mm)	True Easting (m)	True Northing (m)	Cut Off Level (m)	Pile Length (m)	Gk Vet Min	Gk Vert Max	Gk Lateral	Qk Vert Min	Qk Vert Max	Qk Lateral	Wk Vert Min	Wk Vert Max	Wk Lateral	EHFs
Roof A	P01	450Dia Roof A	450	234026.836	424243.211	88.365	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P02	450Dia Roof A	450	234027.380	424244.447	88.365	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P03	450Dia Roof A	450	234028.072	424242.667	88.365	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P04	450Dia Roof A	450	234028.616	424243.903	88.365	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P05	450Dia Roof A	450	234030.425	424251.371	88.255	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P06	450Dia Roof A	450	234030.969	424252.606	88.255	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P07	450Dia Roof A	450	234031.661	424250.827	88.255	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P08	450Dia Roof A	450	234032.204	424252.063	88.255	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P09	450Dia Roof A	450	234034.014	424259.532	88.180	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P10	450Dia Roof A	450	234034.558	424260.768	88.180	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P11	450Dia Roof A	450	234035.250	424258.989	88.180	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P12	450Dia Roof A	450	234035.794	424260.224	88.180	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P13	450Dia Roof A	450	234047.362	424234.183	88.280	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P14	450Dia Roof A	450	234047.906	424235.418	88.280	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P15	450Dia Roof A	450	234048.598	424233.639	88.280	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P16	450Dia Roof A	450	234049.142	424234.875	88.280	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P17	450Dia Roof A	450	234050.408	424242.583	88.190	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P18	450Dia Roof A	450	234050.950	424243.819	88.190	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P19	450Dia Roof A	450	234051.642	424242.040	88.190	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P20	450Dia Roof A	450	234052.185	424243.276	88.190	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P21	450Dia Roof A	450	234053.450	424250.984	88.205	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P22	450Dia Roof A	450	234053.993	424252.220	88.205	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P23	450Dia Roof A	450	234054.686	424250.440	88.205	11.500	45	130	10	0	55	10	-55	105	10	25
Roof A	P24	450Dia Roof A	450	234055.229	424251.676	88.205	11.500	45	130	10	0	55	10	-55	105	10	25

**Safety, Health and Environmental Information**  
For Health and Safety Information, refer to discipline specific Project Hazard Record. (151667-TSA-30-MVL3-REG-W-ST-180000)



**Legend**  
Existing  
To be Removed  
Proposed

Note: Elements in grey shown for context only. Refer to relevant drawings for information relating to these elements.

- Notes**
- All dimensions are in millimetres, all levels are in metres unless stated otherwise.
  - Do not scale from this drawing.
  - Refer to drawing 151667-TSA-30-MVL3-DRG-S-ST-180000 for General Notes.
  - In constructing or maintaining the Works identified as Scheduled Works in Schedule 1 of the Network Rail (Huddersfield to West Town (Dewsbury) Improvements Order, Network Rail may deviate from the dimensions shown on this drawing to the extent permitted by the Order.

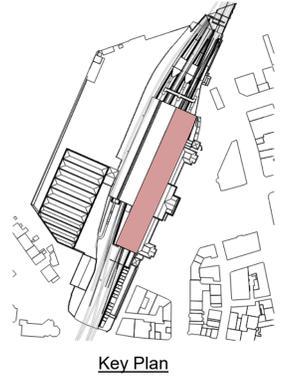
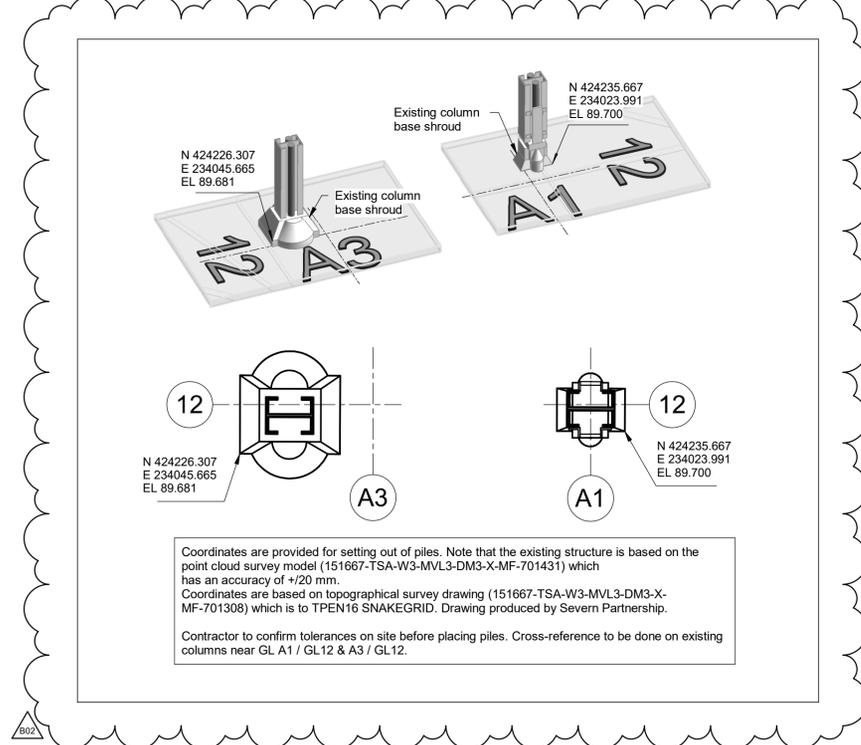
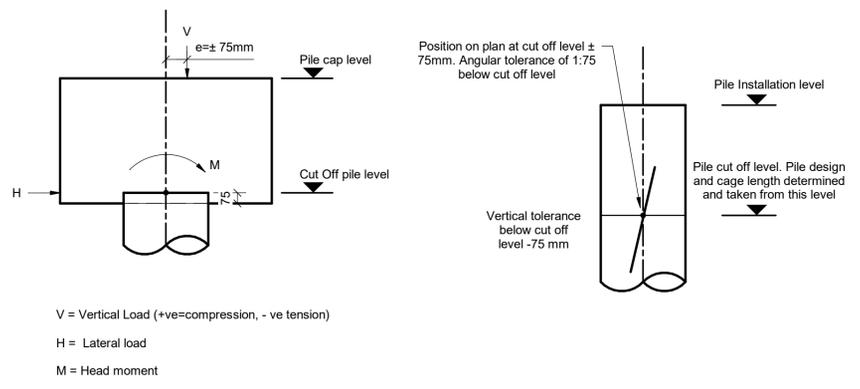
**NOTE**

- All pile loads are characteristic (unfactored). Loads to be combined for ultimate state design in accordance to BS EN 1990 and BS EN 1997
- Lateral loads and heads moment act in the direction most unfavourable for pile design
- Pile load given are the greatest values that single instance will experience
- Head moment includes an allowance for 75mm positional tolerance

All new piles to be:  
450mm dia. piles.  
C32/40 concrete with 75mm cover.  
6No. B16 bars (continued to the base of the piles).  
B10 spiral links at 175mm centres.

Piling contractor to design the pile reinforcement cages to suit their installation methodology.

For geotechnical information, refer to the Geotechnical Design Report (151667-TSA-30-MVL3-REP-W-GE-030407) and the Ground Investigation Report (151667-TSA-30-MVL3-REP-W-GE-030110)



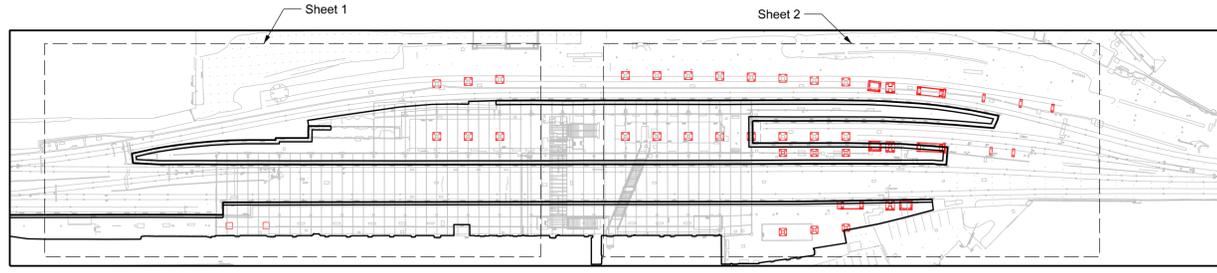
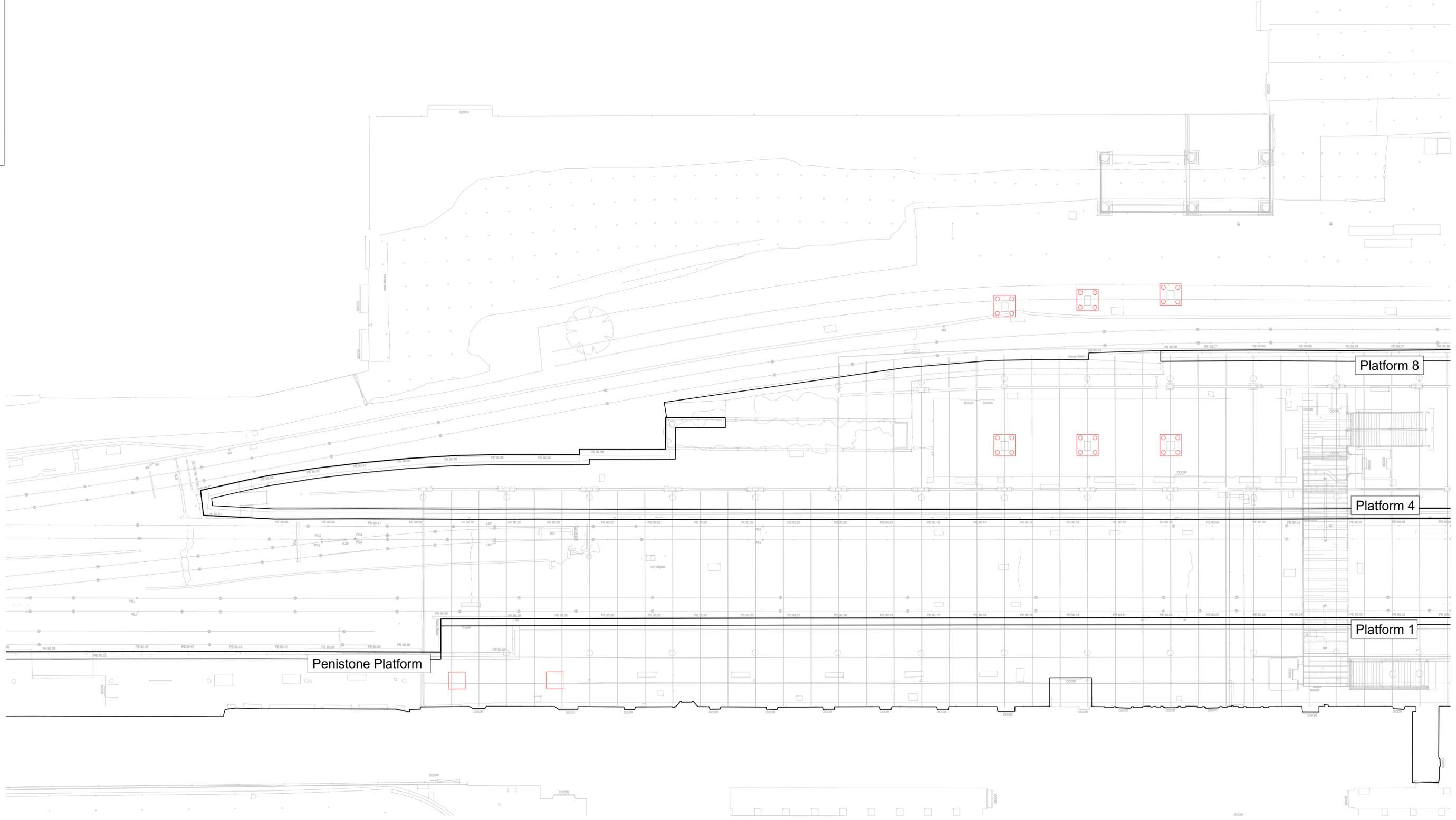
THE NETWORK RAIL (HUDDERSFIELD TO WEST TOWN (DEWSBURY) IMPROVEMENTS) ORDER

B01	08/12/22	Issued for F003 approval	DP	SR	JP
B02	05/06/23	Issued for ???	DP	GL	JP
Rev	Date	Description of Revisions	Drawn	Chkd	Appr
Status					Suitability

**Fit for Internal Review and Comment** **S3**



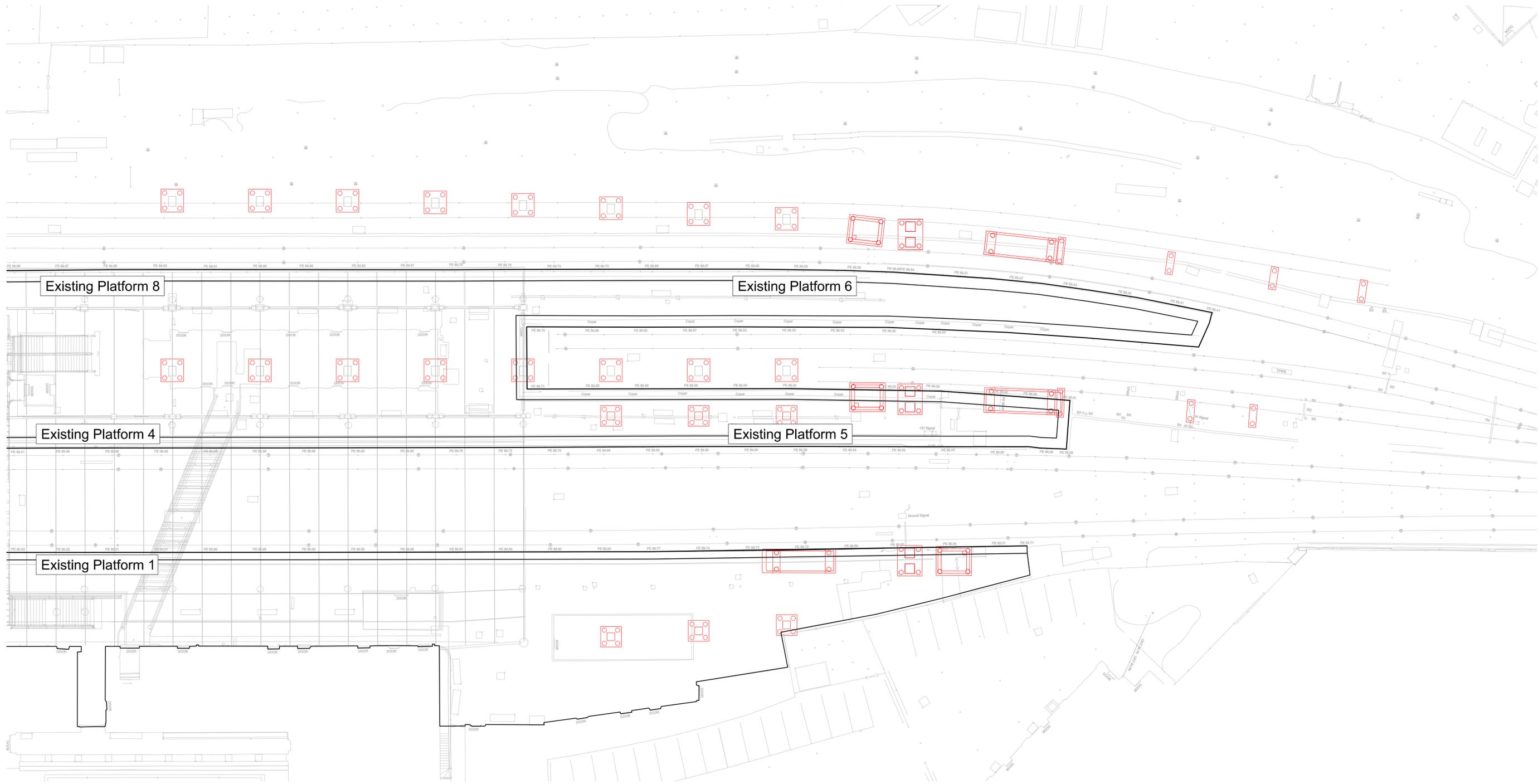
Authorised	Signed	Date
Contractor(s) <b>TRU - West Alliance</b>		
Location/Level STALYBRIDGE STN - HEATON LODGE JN (HUDD-MANC LINE)		
Type CAD Drawing	Sub-type	
Role Structural	Sub-Role Structures and Buildings	
Zone Huddersfield	Phasing Proposed	
Project Transpennine Route Upgrade		
Contract no. <b>151667</b>		
Contract Title <b>TRU - West of Leeds</b>		
Drawing Title <b>W3 - 30 - Huddersfield Station Roof A Pile Schedule Sheet 1 of 1</b>		
Designed S. Rai	Signed <i>[Signature]</i>	Date 05/06/23
Drawn D. Parker	Signed <i>[Signature]</i>	Date 05/06/23
Checked G. Lunardi	Signed <i>[Signature]</i>	Date 05/06/23
Approved J. Portlock	Signed <i>[Signature]</i>	Date 05/06/23
Scale(s) Not to scale	ELR & Mileage 25.1188 to 25.1428	
Alternative Reference	Sheet 1 of 1	Revision
Drawing Number <b>151667-TSA-30-MVL3-DRG-S-ST-180002</b>	Revision <b>B02</b>	



Sketch Title: Huddersfield Sketch Proposed Pile Layout - Sheet 1	Alternative Reference: -	Sheet: 1 of 4
Drawing Number: 151667-TSA-30-MVL3-SKH-C-ST-172900	Revision: -	



Drawing Number  
151667-TSA-30-MVL3-SKH-C-ST-172900



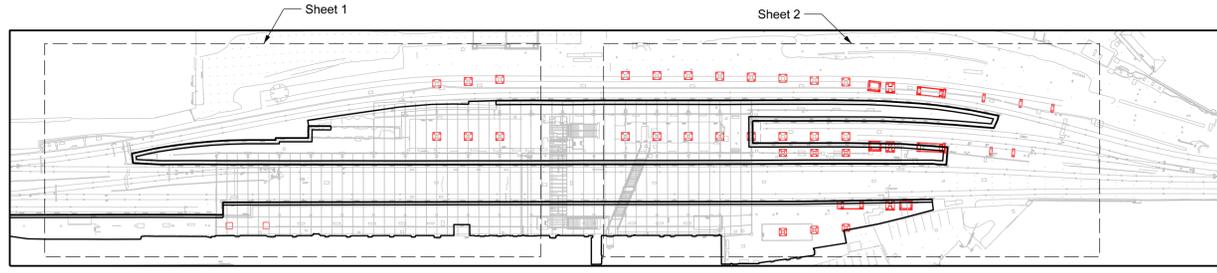
Existing Platform 8

Existing Platform 6

Existing Platform 4

Existing Platform 5

Existing Platform 1



Sheet 1

Sheet 2



Sketch Title: Huddersfield Sketch Proposed Pile Layout - Sheet 2	Alternative Reference: -	Sheet: 2 of 4
Drawing Number: 151667-TSA-30-MVL3-SKH-C-ST-172900	Revision: -	

## **APPENDIX C – PILING RISK ASSESSMENT – HUDDERSFIELD VIADUCT**

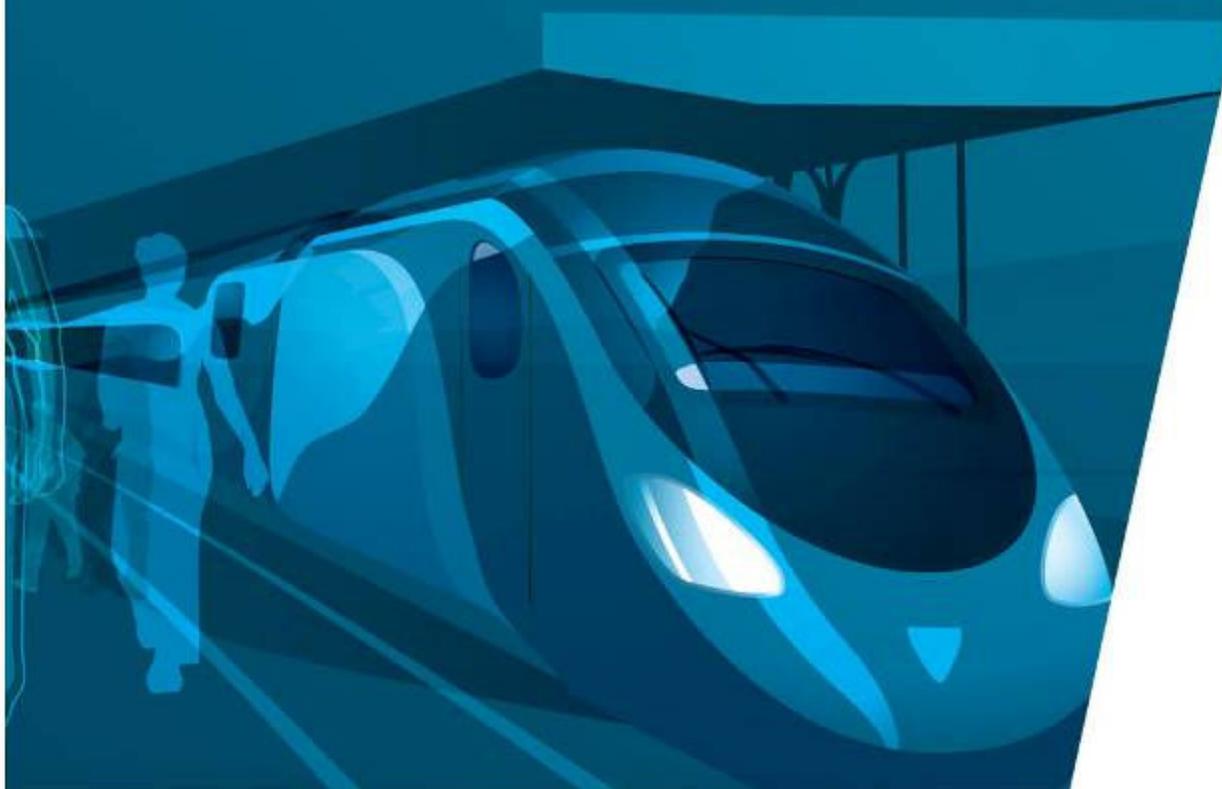
**NetworkRail**

# Huddersfield Viaduct Span 29

## Piling Risk Assessment

Network Rail

June 2023



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## 1. INTRODUCTION

### 1.1. Scheme Background

1.1.1 The Transpennine Route Upgrade Programme (TRU) 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.

### 1.1. Objectives

1.1.2 The objective of this report is to assess the potential risk to controlled waters and human health associated with the proposed piling activities that are to be undertaken at the Huddersfield Viaduct Span 29 (the “site”). This assessment was undertaken in line with relevant Environment Agency (EA) guidance (1) (2).

### 1.2 Information sources

1.2.1 The following sources of information have been used in this report:

- Network Rail, Environment Statement Volume 2ii: Huddersfield, 2019 (3).
- Groundsure, Enviro Insight report and Historical Mapping, 2019 (4).
- Transpire Alliance, W3 - GEO - Mining Risk Mitigation Remit: Report, 151667-TSA-W3-000-REP-W-GE-030510 A01, May 2022 (5).
- Structural Soils Ltd, Factual Report on Ground Investigation W3-MVL3-GRIP4-Huddersfield Viaduct and Station Survey Report, 2022 (6).
- Zetica UXO online risk mapping (7).

### 1.3 Limitations

1.3.1 The report authors are responsible for selecting and summarising the data supplied by third parties but cannot be held responsible for any mistakes or inaccuracies or the completeness of third-party data on which it has relied. 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. Therefore, this report cannot guarantee against unexpected ground conditions occurring between the sampling points.

1.3.2 Constraints relating to geotechnical hazards, ecology, heritage, flooding/drainage, utilities, air quality and noise are beyond the remit of this report.

1.3.3 The report has been prepared using all chemical testing and monitoring data identified and available at the time of writing. The data used in this report is recorded within factual reports provided by contractors. The ground investigations were combined geotechnical and geo-environmental investigations, and environmental sampling was not undertaken at all locations.

1.3.4 Ground gas and groundwater conditions are based on observations made at the time of the ground investigations and monitoring programmes, and may be subject to variation due to atmospheric, seasonal or other effects.

1.3.5 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.

1.3.6 This report does not advise on measures to manage risks associated with asbestos, where present. Detailed advice should be sought from a specialist contractor.

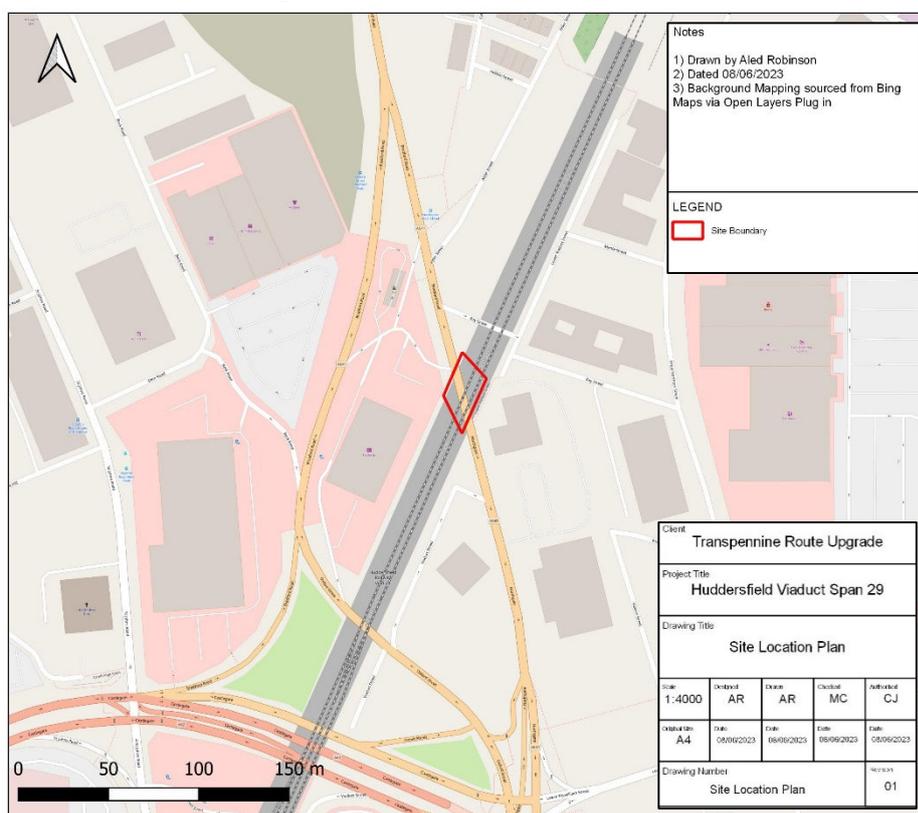
## 2. THE DEVELOPMENT

### 2.1 Site location

2.1.1 The site is located within the Stalybridge Station to Heaton Lodge Junction (part of the Manchester Victoria and Huddersfield Line) railway line at approximate chainage 42000. The site is centred on Ordnance Survey (OS) coordinate 414542E, 417403N and comprises a rail viaduct, oriented approximately north-north east to south-south west passing over the A641, Northgate Road, oriented approximately north-north west to south-south east. The site is at an approximate elevation of 73 m above ordnance datum (m AOD).

2.1.2 A location of the site is shown in Figure 2-1.

**Figure 2-1 – Site Location Plan**



### 2.2 Proposed development

2.2.1 The proposed development comprises the upgrade of the railway viaduct at the site (Span 29) as part of wider TRU works. Proposed piling activities include 20 No. 900 mm rotary core bored piles to depths between 12.5 and 16.0 metres below ground level (m bgl). Proposed piling is presented on drawing 151667-TSA-30-MVL3-DRG-C-ST-040948 P01.1, 2023, appended in Appendix A.

### 3. SITE CHARACTERISTICS

#### 3.1 Site characteristics

3.1.1. A summary of the historical and environmental setting of the site is presented in Table 3-1. This information has been summarised from the information used to inform the Environmental Statement (3).

**Table 3-1 Summary of the site’s historical and environmental setting**

Item	Description
Current site description and use	The site comprises a rail viaduct, oriented approximately north-north east to south-south west passing over the A641, Northgate Road, oriented approximately north-north west to south-south east.
Key historical land uses	<p>The following features were identified on-site;</p> <ul style="list-style-type: none"> <li>- Railway (1907 – present).</li> </ul> <p>The following historical features were located within 250m of the site;</p> <ul style="list-style-type: none"> <li>- Electrical substations (1978-1993)</li> <li>- Historical garages (1958-1998)</li> <li>- Unspecified Depot (1975-1985)</li> <li>- Railway Sidings (1938-1966)</li> <li>- Tramway and omnibus Depot (1905-1966)</li> <li>- Abattoirs (1985)</li> <li>- Goods Station and yard (1956-1966)</li> <li>- Unspecified Mills (1905-1985)</li> <li>- Printing Works (1905)</li> <li>- Unspecified warehouse (1985)</li> <li>- Timber Yard (1985)</li> <li>- National Shell Factory (circa WWI)</li> <li>- Petrol Station (1983-Present)</li> <li>- Unspecified Tank (1890- present)</li> <li>- Tunnel (1984-present)</li> </ul>
Geology	<p><b>Made Ground:</b> No Made Ground is mapped on-site by the British Geological Survey. Made Ground is mapped approximately 65 m north west of the site and within 250 m of the site to the south and west. Made Ground is anticipated to be present at the site associated with historical development of the A641 and rail viaduct.</p> <p><b>Superficial Deposits:</b> Site is underlain by Head deposits comprising of clay, silt, sand and gravel.</p> <p><b>Bedrock Geology:</b> Site is underlain by Soft Bed Flags (sandstone with interbedded mudstone) of the Pennine Lower Coal Measures Formation. A bedrock fault is located approximately 175 m north of the site, with two coal seams located within 250m of the site.</p>
Mining	The site is located within a surface coal resource area, a development high risk area and a probable shallow coal mine working area (8). No mine entries are recorded within 250 m of the site.
Hydrogeology	<p><b>Superficial Aquifer:</b> Head: Secondary (undifferentiated) aquifer</p> <p><b>Bedrock Aquifer:</b> Lower Pennine Coal Measures Formation: Secondary A aquifer</p> <p>The site is not located within 250 m of a Source Protection Zone (SPZ).</p> <p>No groundwater abstractions are located within 250 m of the site.</p>
Hydrology	<p>No surface water features are located within 250 m of the site. Hebble Beck is culverted to the north of the site, expected to be approximately 150 m from the site at its closest point. Hebble Beck is present at the surface approximately 320 m north east of the site at its closest point.</p> <p>The nearest surface water is Huddersfield Broad Canal, located approximately 270 m east of the site. The chemical and ecological quality of the canal are not classified by the Environment Agency. The River Colne is present 600 m east of the site and flows in a</p>

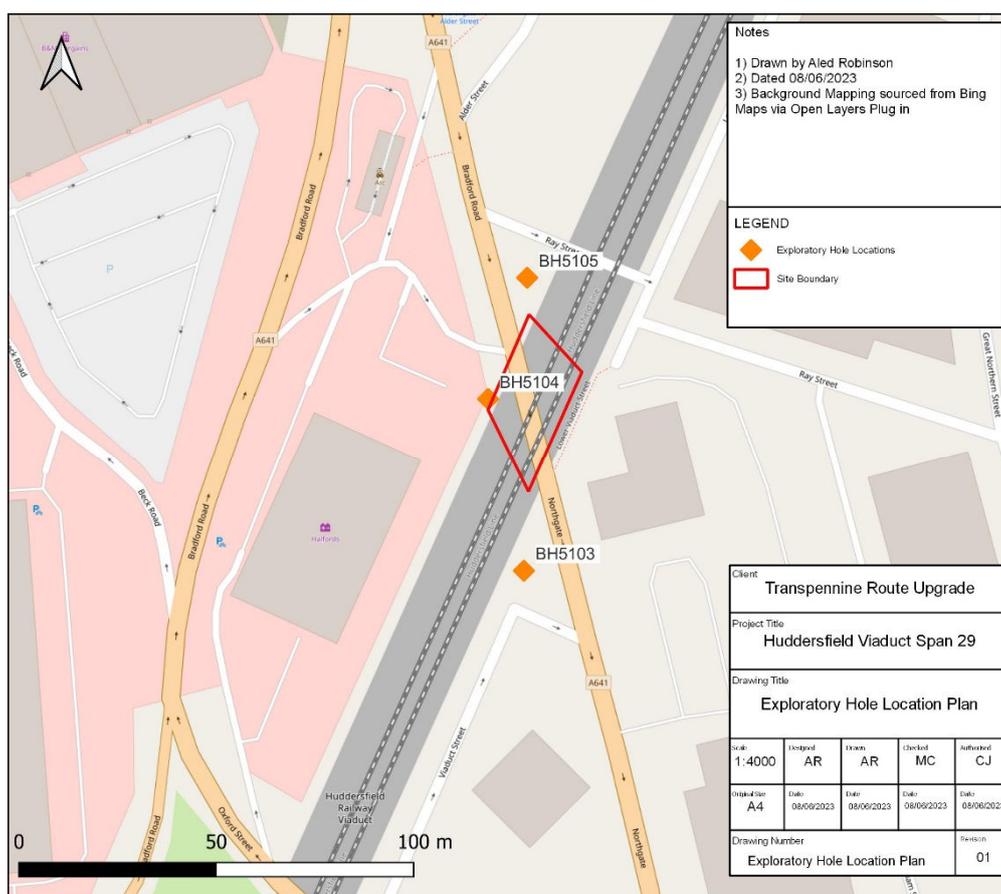
Item	Description
	northerly direction. The River Colne was classified by the Environment Agency in 2019 as having moderate ecological quality and failed chemical quality assessment.
Landfills and Waste	<p>There are no active or historical landfills sites within 250 m of the site</p> <p>There are two licensed waste sites within 250 m of the site related to A K Auto Centre, a vehicle depollution facility. These are located approximately 160m north of the site and have issue dates of 31/08/2012.</p> <p>There is one waste exemption site within 250 m of the site, this relates to a treating waste exemption located approximately 200 m west of the site.</p>
Discharge consents	<p>There are no licensed discharges to groundwater within 250 m of the site.</p> <p>There is one active licensed discharge to surface water, this is located approximately 195m north of the site and relates to sewage discharge into a tributary of the Hebble Beck.</p> <p>A historical surface water discharge is located approximately 230 m south of the site and was for sewage discharge into the Hebble Beck.</p>
Pollution Incidents	<p>No pollution incidents are recorded within 250 m of the site.</p> <p>Two active and four historical licensed pollutant releases are recorded within 250 m of the site. The closest active licensed release is recorded approximately 120 m north of site and relates to the unloading of petrol into storage at service stations.</p>
Pollution Controls	No pollution controls are identified on site or within 250 m of the site.
Trade Directory Entries and Fuel Stations	<p>The Groundsure Data indicated no recent industrial land uses on-site, however a total of 47 recent industrial land uses were identified within 250 m of the site, these include;</p> <ul style="list-style-type: none"> <li>- Vehicle Repair, testing and servicing</li> <li>- Vehicle parts and accessories,</li> <li>- Construction and tool hire</li> <li>- Vehicle Hire and rental</li> <li>- Unspecified works or factories</li> <li>- Electrical features</li> <li>- Business parks and industrial estate</li> <li>- Containers and storage</li> <li>- Medical equipment, supplies and pharmaceuticals</li> <li>- Petrol and fuel stations</li> <li>- Textile's, fabrics, silk and machinery</li> <li>- Published good</li> <li>- New and second-hand vehicles</li> <li>- Photographic and optical equipment</li> </ul> <p>The closest petrol station is operated by Tesco and is located approximately 230m south of the site.</p>
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.).
Radon	The site is located within an area where maximum radon potential is 1-3%, Radon mitigation measures may therefore be required (not assessed within this report).
UXO Risk	Zetica online risk mapping (7) suggests that the site has a low risk of UXO, with no strategic targets or other points of note located within 2 km of the site.

## 4. GROUND INVESTIGATION

### 4.1 Introduction

4.1.1 A ground investigation (GI) was undertaken at the site in 2020 by Structural Soils LTD (SSL). A factual report was completed in 2022 summarising the works completed (6). The GI included the completion of three boreholes in the immediate vicinity of the site (within 25 m of the proposed piling): namely, BH5103, BH5104 and BH5105. Borehole locations are presented in Figure 4-1.

**Figure 4-1 – Borehole Location Plan**



4.1.2 The boreholes were completed via dynamic sampling followed by rotary core follow on to a maximum depth of 23.0 m bgl. Locations BH5104 and BH5105 were installed with a 50 mm diameter gas/groundwater monitoring wells.

4.1.3 Six rounds of gas and groundwater level monitoring were undertaken at locations BH5104 and BH5105 between 22 January and 29 March 2021.

### 4.2 Ground conditions

4.2.1 All three GI locations identified Made Ground, superficial deposits and bedrock of the Pennine Lower Coal Measures Formation. Ground conditions encountered, along with general descriptions of the geology logged, are summarised in Table 4-1, below.

**Table 4-1 Ground Conditions**

Strata		Depth to top of strata (m bgl)	General description
Made Ground		0.00 (ground level)	Slightly sandy slightly gravelly CLAY to gravelly SAND with occasional to frequent anthropogenic fragments of brick, concrete, clinker, ash and slate.
Superficial Deposits	Head	1.25 - 2.60	Variable gravelly sandy CLAY to sandy GRAVEL with occasional gravels.
	Soft Bed Flags	5.30 to 8.10	Sandy GRAVEL to gravelly COBBLES. Strata not identified in BH5105
Bedrock Deposits	Pennine Lower Coal Measures Formation	8.35 to 13.0	SILTSTONE with occasional layers of sandstone and mudstone

### 4.3 Visual and Olfactory Evidence of Contamination

4.3.1 No visual or olfactory evidence of contamination was reported in the three borehole locations during the GI.

### 4.4 Soil Sampling

4.4.1 Environmental samples were collected during the GI. Four soil samples from Made Ground were sent for laboratory analysis for a range of determinands including asbestos, inorganics (including ammonium, sulphate, cyanide), metals and organics (total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH) and BTEX (benzene, toluene, ethylbenzene and xylene). Analysis of corresponding leachate samples reported similar determinands in exceedance of the laboratory detection limit.

4.4.2 The laboratory report identified concentrations of inorganic determinands metals, TPH and PAH above laboratory detection limit. The maximum reported concentration of total TPH was 5,810 mg/kg from a sample at 0.5 m bgl in BH5104. The maximum reported concentration of total PAH was 1,460 mg/kg, reported in a sample from 1.10 m bgl, also in BH5104. BH5104 is located on the western boundary, in the centre of the site.

4.4.3 No asbestos or BTEX were reported above the laboratory detection limit. Full results of the analysis are presented in Appendix E in the SSL 2022 factual report (6).

### 4.5 Gas Monitoring

4.5.1 Ground gas monitoring was undertaken at the site on monitoring wells installed within BH5104 and BH5105.

4.5.2 A maximum flow rate of 0.2 litres per hour was reported at both monitoring locations. The

maximum concentration of carbon dioxide (CO<sub>2</sub>), 3.1% volume, was recorded in BH5104. Hydrogen Sulphide (H<sub>2</sub>S) and methane were not detected above the instrument detection limit in either location during any monitoring round. A single identification of carbon monoxide was reported in BH5105 on 4 March 2021 at 1 parts per million (ppm).

#### 4.6 Chemical Attack – Sulphate Classification

4.6.1 Sulphate classification of ground conditions will be undertaken by the piling design team.

#### 4.7 Groundwater level

4.7.1 Groundwater levels were monitored as part of the gas monitoring at locations BH5104 and BH5015 across six monitoring rounds. Groundwater levels reported throughout the gas monitoring are presented in Table 4-2, below.

**Table 4-2 Groundwater Levels**

Borehole	Date:	22/01/2021	11/02/2021	18/02/2021	04/03/2021	16/03/2021	29/03/2021
BH5104	m bgl	5.54	5.57	5.53	5.56	5.54	5.56
	m AOD	68.32	68.29	68.33	68.3	68.32	68.3
BH5105	m bgl	4.58	4.59	4.61	4.63	4.58	4.62
	m AOD	68.52	68.51	68.49	68.47	68.52	68.48

4.7.2 As only two monitoring points are available groundwater flow direction cannot be identified, however from the data it could be any, generally northerly, direction. Culverted Hebble Beck is present north of the site and may be receiving groundwater.

4.7.3 Regional groundwater flow is anticipated to be generally north easterly, towards the Huddersfield Broad Canal and River Colne. The River Colne is present approximately 600 m east of the site at its closest point and flows in a northerly direction. The Huddersfield Broad Canal is located approximately 270 m east of the site at its closest point but is likely to be engineered and hydraulically isolated from groundwater. The degree of hydraulic connectivity between canal and groundwater is unknown.

### 5. COAL MINING RISK ASSESSMENT

5.1.1 A Mining Risk Assessment (MRA) has been undertaken for the track length surrounding and including the site (5) due to the presence of coal bearing strata and potential historical mine workings area of the site associated with the Pennine Lower Coal Measures. The MRA identified a number of shafts in the wider area of the proposed area of piling, the closest being over 250 m up and down chainage from the site.

5.1.2 The MRA recommended that identified high-risk areas outside of the site were to undergo probing and grouting of voids as well as the use of gas protection measures due to the risk associated with hazardous ground gas when drilling or grouting near coal seams. The MRA did not specify any required works in the immediate location of the proposed piling at the site.

### 6. PROPOSED PILING TECHNIQUE

6.1.1 Piling activity is currently proposed to include 20 rotary bored piles to a maximum depth of 16.0 m bgl. The piles will terminate within the Pennine Lower Coal Measures at between approximately 57.5 and 61.0 m AOD.

- 6.1.2 The proposed method for piling activities at the site, rotary boring, is a non-displacement piling method with excavated soil removed as arisings and then piles cast in-situ within the ground. This method ensures materials are not pushed downwards through differing lithologies, protecting underlying groundwater from potential contaminants.
- 6.1.3 Given the groundwater levels shown in Table 4-2, the proposed piling activity will interact with groundwater beneath the site.

## 7. PILING RISK ASSESSMENT

### 7.1 Methodology

- 7.1.1 The piling risk assessment has been completed according to the methodology and framework set out in the EA guidance on piling on contaminated land (1).
- 7.1.2 This guidance sets out the following six pollution scenarios (PS) that may occur during piling operations on potentially contaminated sites:
- PS1 - Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an aquifer;
  - PS2 - Creation of preferential pathways through a low permeability surface layer, allowing migration of soil gas, coal seam gas or contaminant vapours to the surface;
  - PS3 - Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface;
  - PS4 - Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of materials;
  - PS5 - The pushing of contaminants down into an aquifer during pile driving; and,
  - PS6 - Contamination of groundwater and subsequently surface waters by wet concrete, cement paste or grout.
- 7.1.3 Based on the piling methodology (rotary bored piles) there is no risk related to impediment of groundwater flow and creation of a groundwater embankment as groundwater will be able to flow around the proposed piles.
- 7.1.4 For piling works, risks to environmental receptors are likely to be greater when:
- Contaminants are present on the site and ground works could allow them to migrate;
  - Piling would breach a low permeability layer or connect two previously discrete aquifers;
  - The site overlies a principal or secondary A aquifer;
  - The site is located within a groundwater SPZ;
  - The groundwater table is shallow or likely to be intersected by piles;
  - The geological strata are fractured or fissured;
  - Works are close to a surface water body and run-off from arisings could pollute those waters.
- 7.1.5 The following section provides a summary of the likelihood and magnitude of potential risks associated with the proposed rotary bored piling against the pollution scenarios that have been identified. As part of this assessment, it has been assumed that standard mitigation measures during piling, good working practices and adherence to design

guidance will be incorporated in the piling design and construction process.

7.1.6 The risk assessment is presented in Table 7-1.

## 7.2 Piling Scenario Assessment

7.2.1 Table 7-1 presents site specific considerations, overall risk and possible mitigation measures for each the identified pollution scenario using bored piling.

**Table 7-1 - Summary of pollution / risk scenarios for piling activities under current site conditions**

Pollution Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
<p>No. 1 Creation of preferential pathway through aquitard</p>	<ul style="list-style-type: none"> <li>• Identification of concentrations of TPH and PAHs above laboratory detection limit identified in soils during the SSL GI.</li> <li>• The Head is unlikely to act as a consistent aquitard due to its heterogeneity (clayey to gravelly) and contains groundwater.</li> <li>• Piling methods potentially involve creation of preferential pathways into an underlying secondary A aquifer.</li> <li>• Any pathway created by bored piles is temporary while the pile is installed and grouted. Once grouted the pathway is no longer present.</li> <li>• Groundwater at the site has a low/moderate environmental sensitivity. The bedrock aquifer is secondary A and it is not within a SPZ.</li> <li>• The closest surface water feature is anticipated to be 150 m from the site, the culverted Hebble Beck.</li> </ul>	<p>Low/Moderate</p>	<ul style="list-style-type: none"> <li>• Use aquifer protection measures during piling/drilling (e.g. telescopic drilling) to inhibit downward migration of identified concentrations of organics through low permeability layers.</li> <li>• Grout/concrete the hole as soon as practicable to close any potential pathway.</li> <li>• Good workmanship during construction of the hole to ensure hole does not collapse.</li> <li>• Watch and brief approach. Monitor composition of arisings. Seek advice if visual or olfactory evidence of contamination is identified.</li> </ul>

Pollution Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
<p>No. 2 Creation of preferential pathway through low permeability surface layer, allowing migration of soil gas, coal seam gas or contaminant vapours to the surface</p>	<ul style="list-style-type: none"> <li>• Source material (Made Ground) present at the site. Potential for volatilisation of identified organic determinands.</li> <li>• Potential for collection of gases and vapours from Made Ground capped by hard standing at site. Potential for release of gases and vapours when hard standing compromised.</li> <li>• Potential for hazardous ground gas release when working near coal bearing strata. GI data have not identified coal bearing seams in the proposed area of piling.</li> <li>• The site is generally open so hazardous gas are unlikely to be able to accumulate. Ground gas monitoring identified generally low concentrations of ground gasses at the site.</li> <li>• Migration of hazardous gases associated with coal workings further from the site will be restricted as mineworking at the site will be grouted prior to piling works (5).</li> <li>• Any pathway created by rotary bored piling is temporary while the pile is installed and grouted. Once grouted the pathway is no longer present.</li> </ul>	<p>Moderate (during construction); Low (during operation)</p>	<ul style="list-style-type: none"> <li>• Completion of gas risk assessment using available data for proposed piling.</li> <li>• Take due consideration of risk and assess accordingly. Contractors to provide mitigation for employees as required, e.g. use of gas alarms.</li> </ul>
<p>No. 3 Direct contact of site workers with contaminated arisings</p>	<ul style="list-style-type: none"> <li>• Concentrations of PAH, TPH and metals above laboratory detection limit from samples of Made Ground material taken during GI works.</li> <li>• Proposed piling does not displace material and creates arisings.</li> </ul>	<p>Moderate/High</p>	<ul style="list-style-type: none"> <li>• Contractors to be made aware of potential for contamination to be present in Made Ground so that appropriate health and safety measures (e.g. use of personal protection equipment) can be implemented.</li> </ul>

Pollution Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
	<ul style="list-style-type: none"> <li>Contaminated material brought to surface, interact with site workers and potential for run-off to nearby drains.</li> </ul>		<ul style="list-style-type: none"> <li>Although not confirmed, presence of asbestos cannot be discounted in Made Ground. Therefore, any personnel working with the Made Ground material should have appropriate training and work under applicable risk assessment prior to the works being undertaken.</li> <li>Ensure no over-rotation of augers, if used within excavation.</li> <li>It is assumed that all arisings will be removed from the site. The arisings should be appropriately classified and treated/ disposed off-site at a suitable waste management facility under an appropriate duty of care. If arisings are to be re-used on site then they must be assessed appropriately under a relevant materials management plan.</li> </ul>
<p>No. 4 Direct contact of the piles with contaminated soil or leachate</p>	<ul style="list-style-type: none"> <li>Proposed locations will penetrate Made Ground, Head and intersect bedrock. Contact between piles and groundwater is likely.</li> </ul>	<p>Low/Moderate</p>	<ul style="list-style-type: none"> <li>Contractors to be made aware of potential for aggressive ground conditions or groundwater.</li> </ul>

Pollution Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
	<ul style="list-style-type: none"> <li>Laboratory analysis has shown there to be concentrations of determinands above laboratory detection limit across the site, including organics.</li> <li>Ground aggressivity has not been classified.</li> </ul>		<ul style="list-style-type: none"> <li>Classification of ground conditions to be undertaken by the piling design team. Appropriate material grade for pilings is to be selected based on the ground conditions and aggressivity following appropriate guidance/legislation.</li> </ul>
<p>No. 5 Pushing solid contamination down into an aquifer</p>	<ul style="list-style-type: none"> <li>By using a bored piling technique material should not be pushed downwards. Non-displacement (bored) piles will remove soil to the surface and therefore do not result in contaminated soils being pushed either laterally or downward into the underlying bedrock.</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>Consideration should be given to use of aquifer protection measures during drilling (e.g. telescopic drilling).</li> <li>Ensure no under-rotation of augers, if used within excavation.</li> </ul>
<p>No. 6 Contamination of groundwater by wet concrete or grout</p>	<ul style="list-style-type: none"> <li>Non-displacement (bored) piles require either (or a combination of) concrete, cement paste or grout to be introduced into the ground. This may result in the loss of wet concrete, cement paste or grout in groundwater, associated with fractured/jointed rocks or areas of unidentified worked coal seams. If retardant additives are used, pile materials could take several hours to set.</li> <li>Pile depth is expected to penetrate the top of the secondary A Pennine Lower Coal Measures aquifer.</li> </ul>	<p>Moderate</p>	<ul style="list-style-type: none"> <li>A high slump concrete mix is recommended to be utilised within the bore reducing the risk of potentially contaminating the groundwater in the secondary A aquifer or surface water in the nearby river.</li> <li>Careful monitoring of grouting rates and total volume used, compared to predicted volumes to provide an early</li> </ul>

Pollution Scenario	Comment	Piling Scenario Risk Rating	Mitigation Measures
	<ul style="list-style-type: none"> <li>No historical mine workings have been identified in the immediate vicinity of the site.</li> <li>The nearest surface water feature is the culverted Hebble Beck, approximately 150 m to the east and so may be hydraulically isolated from groundwater.</li> <li>Grouting of previous mineworking is proposed for off-site areas where historical mine workings have been identified.</li> </ul>		<p>indication of potential migration.</p>

## 8. SUMMARY AND RECOMMENDATIONS

### 8.1 Summary

- 8.1.1 A piling risk assessment has been undertaken for the proposed works at the Huddersfield viaduct span 29. The risk assessment was completed based on design drawings 151667-TSA-30-MVL3-DRG-C-ST040948 P01.1. Based on the design drawings, the piling work is expected to extend to an elevation of between approximately 57.5 and 61.0 m AOD.
- 8.1.2 The assessment has been reviewed based on proposed rotary bored piles, a non-displacement piling method. The identified depth to groundwater suggests that all piles are expected to intersect groundwater and terminate in the bedrock of the Pennine Lower Coal Measures formation (secondary A aquifer). A risk assessment was undertaken to reflect current site conditions at the site.
- 8.1.3 Concentrations of inorganic and organic determinands above laboratory detection limit from soil samples collected at the site. The site is underlain by secondary A aquifers in the superficial and bedrock, and a culverted water course is present 150 m to the north of the site (Hebble Beck).
- 8.1.4 The site lies within a surface coal resource area, a development high risk area and a probable shallow coal mine working area. No mine entries are recorded within 250 m of the site. The proposed piling activity will interact with the Pennine Lower Coal Measures but no coal seams have been identified within sources reviewed.
- 8.1.5 The piling options discussed above are subject to appropriate workmanship, mitigation and ensuring QA/QC measures are adopted. The piling works should also be subject to appropriate oversight and method statements. Should the proposed depths or techniques of piling be changed then this assessment should be reviewed.
- 8.1.6 Based on the assessment undertaken, the risk rating for bored piles was moderate/high for PS3 while a low to moderate risk was associated with PS1, PS2, PS4 and PS6.
- 8.1.7 There was a low/moderate risk for PS1 and PS2, creation of preferential pathways due to the presence of concentrations of organic determinands in excess of the laboratory detection limit in areas of proposed piling work and the associated potential generation of vapours. For similar reasons there was a moderate/high risk for PS3, contact with contaminated arisings, due in particular to the presence of asbestos detected in the soils.
- 8.1.8 The risk associated with PS3 can be managed with appropriate health and safety measures for site workers and suitable storage and disposal of arisings under an appropriate duty of care or in line with an applicable materials management plan. The risks associated with PS1 and PS2 can be mitigated by use of aquifer protection measures during drilling (e.g. telescopic drilling) to inhibit downward migration of identified contamination through low permeability layers and use of suitable gas alarms and appropriate health and safety measures.
- 8.1.9 Aggressivity of ground has not been determined and so the risk from PS4 requires classification of potential aggressive ground conditions by the piling designer. Any identified aggressive conditions can be mitigated by use of appropriate pile materials to the identified conditions. The risk from PS6 (contamination of groundwater by wet concrete or grout) can be mitigated by use of a high slump concrete mix in the piles and monitoring of grouting rates/comparison to calculated volumes throughout piling.

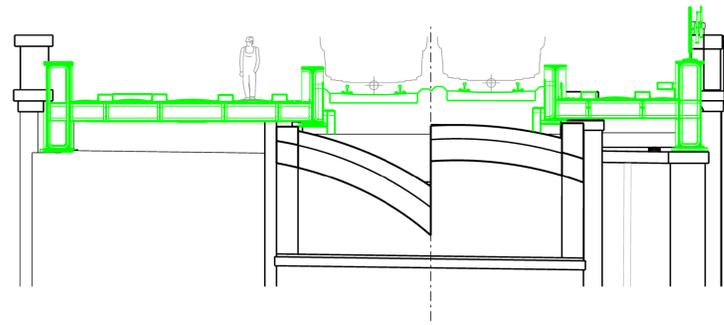
## 8.2 Recommendations

- 8.2.1 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).
- 8.2.2 Use aquifer protection measures during piling/drilling (e.g. telescopic drilling) to inhibit downward migration of identified concentrations of determinands through low permeability layers.
- 8.2.3 Ensure good workmanship during construction to ensure the hole does not collapse and soil does not migrate vertically into the underlying Secondary A aquifer(s).
- 8.2.4 The addition of grout/concrete as soon as practicable after drilling, to quickly close any potential pathway;
- 8.2.5 Elevated hazardous ground gas was not identified. However, completion of a formal gas risk assessment and due consideration of risk and reasonable mitigation e.g. use of gas alarms is recommended.
- 8.2.6 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.
- 8.2.7 Sulphate classification of ground conditions is to be undertaken by the piling design team. Appropriate material grade for piles is to be selected based on the ground conditions and aggressivity following appropriate guidance/legislation (9).
- 8.2.8 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.
- 8.2.9 Ensure no under-rotation of augers (if used within excavation) to prevent material being pushed downwards into the aquifer.

## 9. REFERENCES

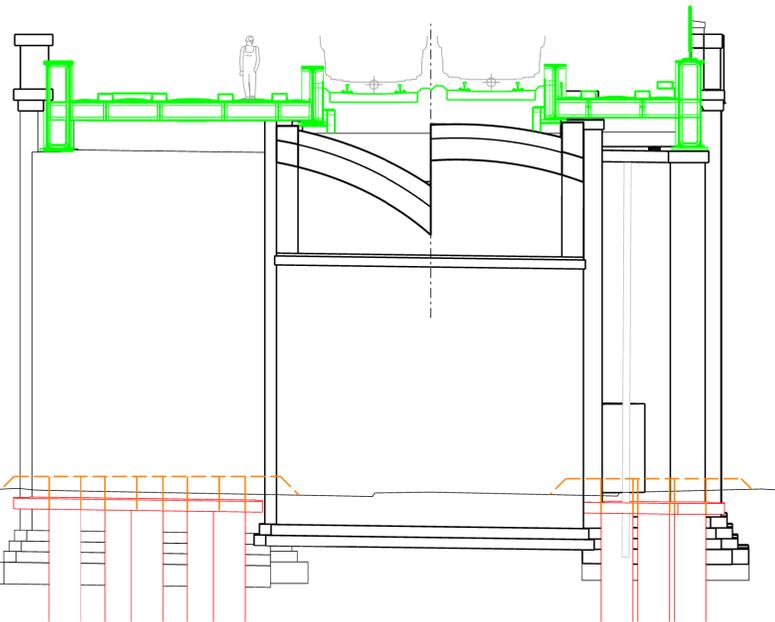
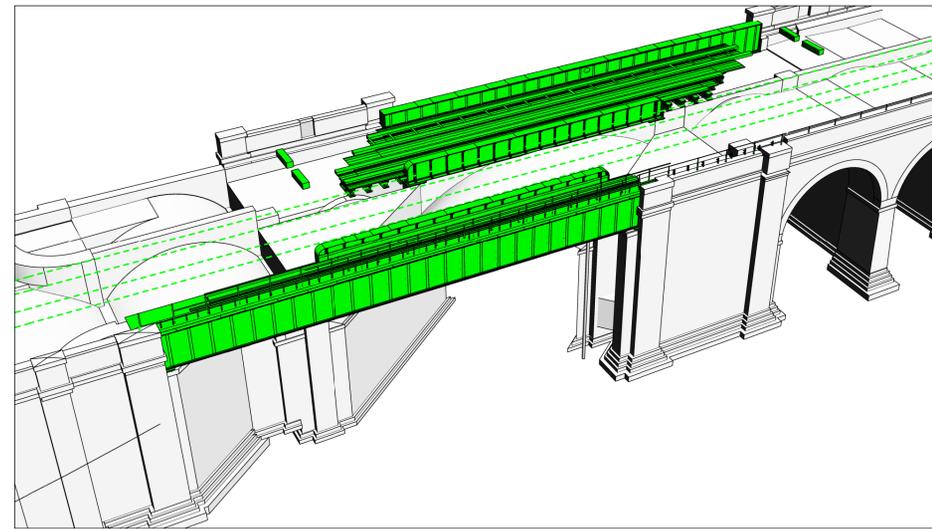
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2. **Environment Agency .** *Piling in layered ground: risks to groundwater and archaeology.* s.l. : Environment Agency, 2006.
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## APPENDIX A – FIGURES AND DRAWINGS

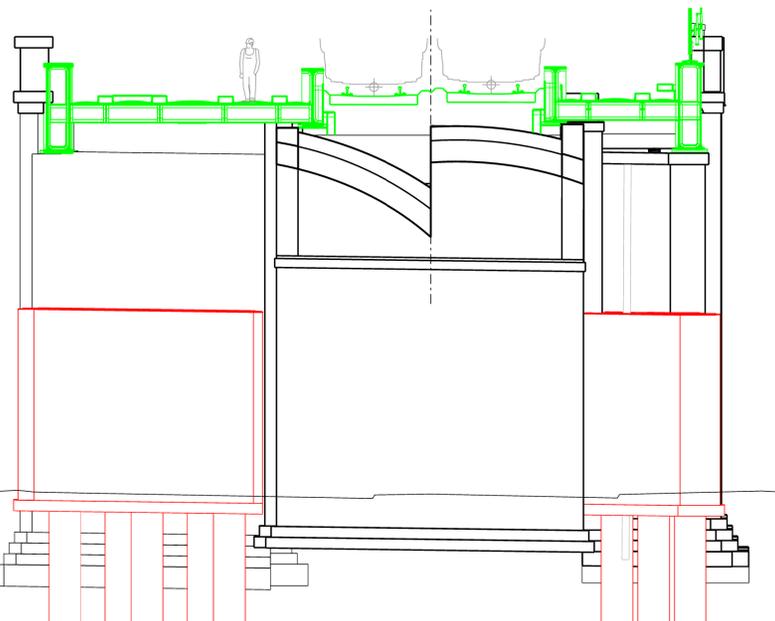
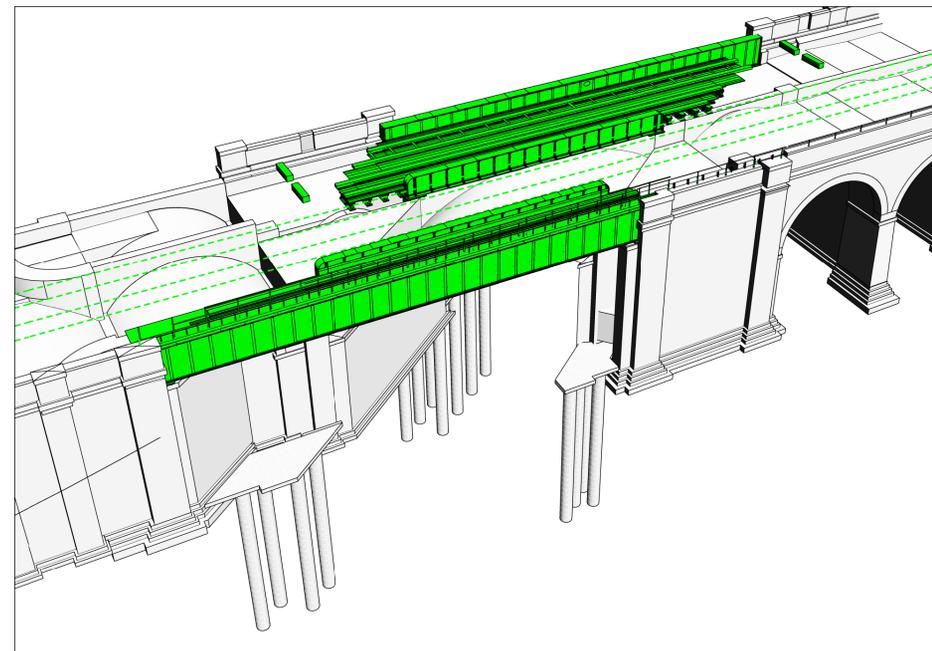


Stage 1:  
Existing & Enabling works  
- Divert utilities

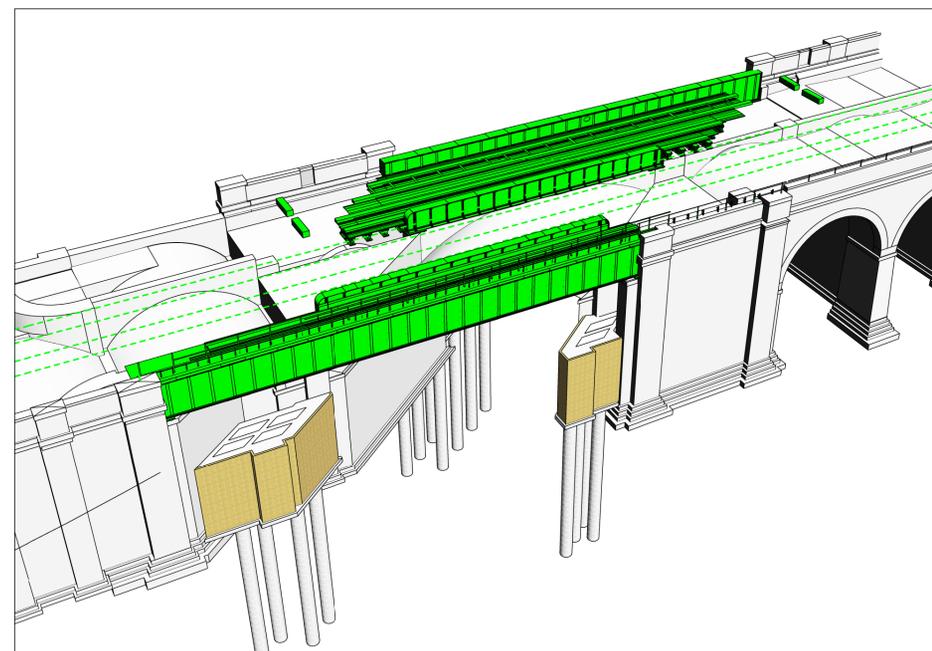
Stage 2:  
Prepare existing abutments  
- Install masonry repairs to abutments  
- Break out Up Deck high mileage concrete corner block  
- Chisel existing stone flat at interfaces with new abutments  
- Possibly remove ballast from Up Deck TBC (remove excess weight before cutting abutment corner masonry straps)  
- Cut lower 2 straps



Stage 3:  
Piling  
- Break out concrete / footpath  
- Trial pit existing abutment footings if not done beforehand  
- Place piling mat  
- Pile foundations (low headroom)  
- Break down piles to required level  
- Install pile cap  
- Place permeable fill in perimeter gap



Stage 4:  
Abutments part 1  
- Build abutments up to 5.4m above pilecap



(Scale for section views - 3D views not to specific scale)

P01.1	03/03/23	First Issue				SJ
Rev	Date	Description of Revisions	Drawn	Chkd	Appr	Suitability
						<b>S0</b>



Authorised \_\_\_\_\_ Signed \_\_\_\_\_ Date \_\_\_\_\_

Contractor(s)  
**TRU West Alliance**

Location STALYBRIDGE STN - HEATON LODGE JN (HUDD-MANC LINE)	
Type CAD Drawing	Sub-type
Role Civil Engineer	Sub-Role Structures and Buildings
Zone Huddersfield	
Phasing Proposed	Project Stage GRIP 5

Project  
**Transpennine Route Upgrade**

Contract No.  
**151667**

Contract Title  
**TRU - West of Leeds**

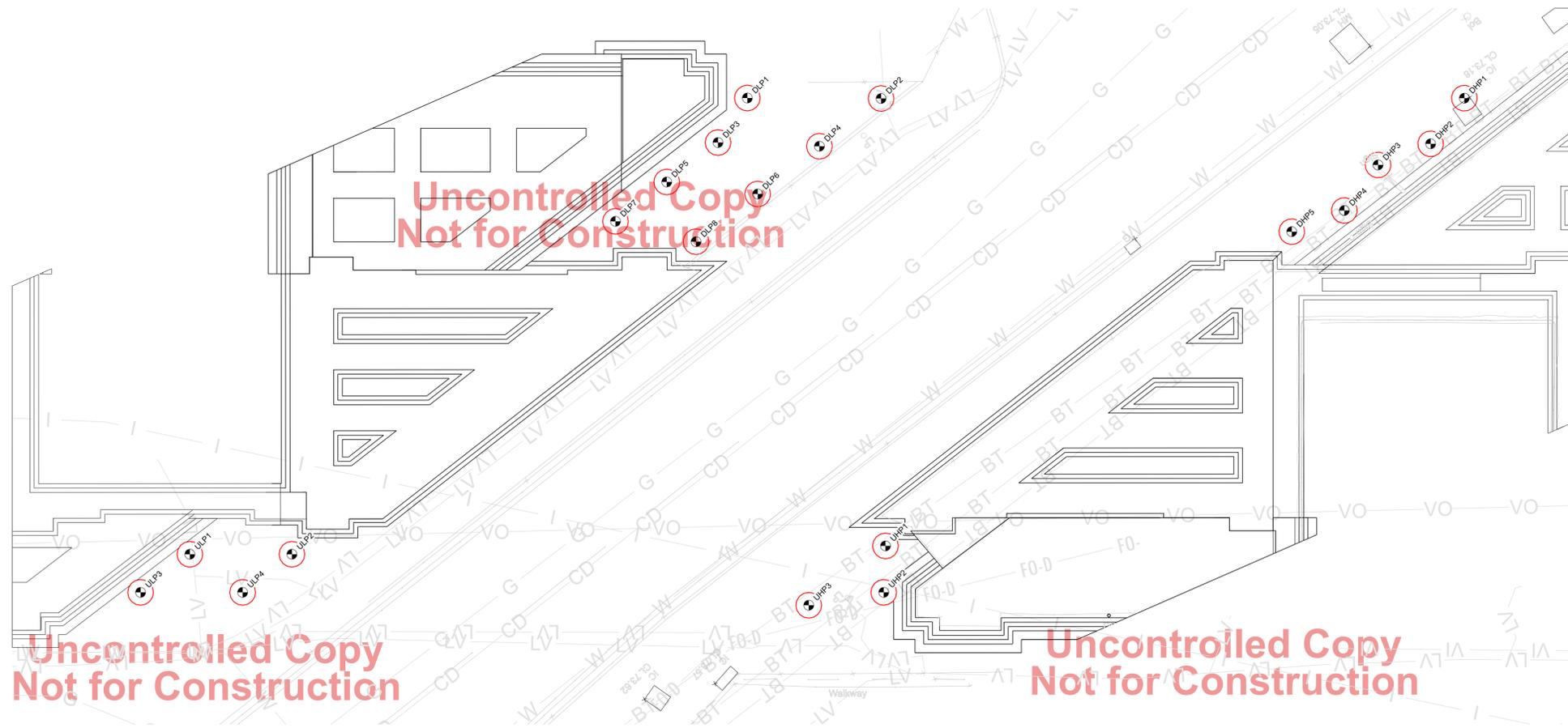
Drawing Title  
**Huddersfield Viaduct Span 29  
Construction Sequence  
Sheet 1**

Designed L.Hardwell	Signed	Date 03/03/23
Drawn S.John	Signed	Date 03/03/23
Checked	Signed	Date
Approved	Signed	Date

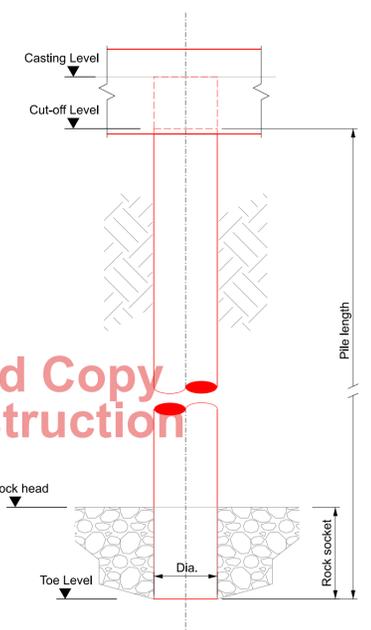
Scale(s)  
**As Shown** ELR & Mileage **26.0151** to **0**

Alternative Reference \_\_\_\_\_ Sheet \_\_\_\_\_ of \_\_\_\_\_

Drawing Number  
**151667-TSA-30-MVL3-DRG-C-ST-040930** P01.1



Proposed Pile Layout  
Scale 1:100



Typical Pile Elevation  
Scale 1:50

Location	Pile and Type	Setting out Points			Length (m)
		SOP Ref.	Eastings	Northings	
Down Low Mileage Abutment	900mm dia RC bored piles	DLP1	234207.617	424665.378	12.5
		DLP2	234209.507	424669.656	
		DLP3	234208.630	424663.814	
		DLP4	234210.170	424667.011	
		DLP5	234209.174	424661.620	
		DLP6	234210.834	424664.366	
		DLP7	234209.717	424659.426	
		DLP8	234211.498	424661.721	
Up Low Mileage Abutment	900mm dia RC bored piles	ULP1	234214.408	424641.126	16
		ULP2	234215.838	424644.396	
		ULP3	234214.937	424639.012	
		ULP4	234216.368	424642.282	
Down High Mileage Abutment	900mm dia RC bored piles	DHP1	234217.671	424688.349	12.5
		DHP2	234218.658	424686.631	
		DHP3	234218.599	424684.650	
		DHP4	234219.585	424682.931	
		DHP5	234219.526	424680.950	
Up High Mileage Abutment	900mm dia RC bored piles	UHP1	234223.890	424663.533	15
		UHP2	234225.354	424662.825	
		UHP3	234224.715	424660.242	

Pile Schedule

\*As built information to be populated by the Contractor

Legend/Notes

Notes:

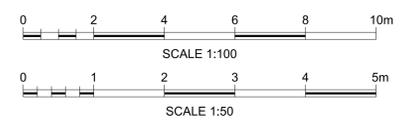
- Refer to general notes and legend on the General Arrangement drawing: 151667-TSA-30-MVL3-DRG-C-ST-040911
- The hazard IDs shown on these drawings refer to the CDM risk register: 151667-TSA-00-TRU-REG-W-SS-000062

Acronyms and Abbreviations:

RC - Reinforced concrete  
CJ - Construction joint  
Nom. - Nominal  
Min. - Minimum  
EPS - Expanded polystyrene

Uncontrolled Copy  
Not for Construction

Safety, Health and Environmental Information  
For Health and Safety information, refer to discipline specific Project Hazard Record.



Rev	Date	Description of Revisions	Drawn	Chkd	Appr
P01.1	21/03/23	First Issue			SJ

Initial Status WIP S0



Authorised: \_\_\_\_\_ Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor(s)  
TRU West Alliance

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

Type  
CAD Drawing

Role  
Civil Engineer

Zone  
Huddersfield

Project  
Transpennine Route Upgrade

Contract No.  
151667

Contract Title  
TRU - West of Leeds

Drawing Title  
MVL3 - 92(9)

Huddersfield Viaduct (Span 29)

Pile Details

Designed: L.Hardwell Signed: \_\_\_\_\_ Date: 21/03/23

Drawn: S.John Signed: \_\_\_\_\_ Date: 21/03/23

Checked: \_\_\_\_\_ Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Approved: \_\_\_\_\_ Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Scale(s)  
As Shown

Alternative Reference  
151667-TSA-30-MVL3-DRG-C-ST-040948

Mark Up by Lee Hardwell  
06/06/2023  
Work in Progress  
For Information for Piling Risk Assessment

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