

NetworkRail

**Transpennine Route Upgrade
Bradley Junction Construction Compound
Phase 1 Land Contamination Desk Study**

Network Rail

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Contents

1. INTRODUCTION 4

 1.1 Background 4

 1.2 Purpose of the document 4

 1.3 Sources of information 4

 1.4 Limitations and assumptions 4

2. THE PROPOSED DEVELOPMENT 6

3. DESCRIPTION OF THE SITE 7

4. ENVIRONMENTAL AND HISTORICAL SETTING 9

5. HISTORICAL GROUND INVESTIGATION 12

 5.1 Description of the investigation 12

 5.2 Ground conditions encountered 13

 5.3 Summary of risk assessment undertaken by JNP Group 18

6. INITIAL CONCEPTUAL SITE MODEL 19

 6.1 Introduction 19

 6.2 Potential contamination sources 19

 6.3 Potential receptors 20

 6.4 Potential pathways 21

7. CONCLUSIONS AND RECOMMENDATIONS 24

8. REFERENCES 28

APPENDIX A – SITE PLANS 30

APPENDIX B – SITE WALKOVER PHOTOGRAPHS 35

APPENDIX C – GROUNDSURE REPORT AND HISTORICAL MAPS 44

APPENDIX D – COAL AUTHORITY CONSULTANTS MINING REPORT 45

APPENDIX E – JNP GROUP PHASE II GEO-ENVIRONMENTAL REPORT 46

APPENDIX F – DEFINITIONS OF RISK PROBABILITY AND CONSEQUENCE 47

Tables

Table 3-1 Summary of walkover 7

Table 4-1 Summary of environmental and historical setting within the site boundary 9

Table 5-1 Summary of 2023 investigation 12

Table 5-2 Testing suites 12

Table 5-3 Summary of ground conditions 13

Table 5-4 Summary of groundwater levels during 2023 monitoring 15

Table 5-5 Summary of anthropogenic materials observed within the logs 16

Table 5-6 Summary of ground gas monitoring undertaken at the site 17

Table 6-1 Conceptual Site Model and Risk Assessment (Use of the Site as a strategic construction compound)..... 22

Table 7-1 Contamination Constraints and Recommended Actions Before/During Construction and Demobilisation of compound..... 25

1. INTRODUCTION

1.1 Background

- 1.1.1 Network Rail is proposing to develop the former Bradley Nurseries into a construction compound, Bradley Junction Construction Compound (“the Proposed Development”) to facilitate the construction works for the section of the Transpennine Route Upgrade (TRU) between Huddersfield and Westtown (Dewsbury) (“the Scheme”).
- 1.1.2 A Transport and Works Act Order (TWAO) for the Huddersfield and Westtown (Dewsbury) section of the TRU was submitted to the Secretary of State for Transport on 31 March 2021 (The Network Rail (Huddersfield to Westtown (Dewsbury) Improvements) Order). Upgrading the railway between Huddersfield and Westtown (Dewsbury) is key to delivering passenger benefits along the Transpennine railway. Network Rail is submitting a standalone planning application under the Town and Country Planning Act 1990 to facilitate the use of the former Bradley Nurseries site (herein referred to as “the site”) as separate works to the Order.

1.2 Purpose of the document

- 1.2.1 This report comprises a Phase 1 Land Contamination Desk Study, which has been prepared to support the application for the Proposed Development.
- 1.2.2 The scope of work comprises:
- Summarising information from desk study sources;
 - A review of historical ground investigation data undertaken at the site by others;
 - Producing a Conceptual Site Model (CSM) identifying potential contamination sources, pathways and receptors in relation to the site being used as a construction compound; and
 - Providing recommendations and suggestions for any further works required.

1.3 Sources of information

- 1.3.1 For this report, a number of publicly available and site-specific sources of information have been reviewed. The main sources include:
- JNP Group (2023); Phase I Geo-environmental Report. Reference S11956-JNP-XX-XX-RP-G-1004 P02, August 2023 [1];
 - JNP Group (2023); Phase II Geo-environmental Report. Reference S11956-JNP-XX-XX-RP-G-1005 P03, June 2023 [2];
 - JNP Group (2023); Coal Mining Risk Assessment. Reference S11956-JNP-XX-XX-RP-G-1002, February 2023 [3];
 - Subsite Surveys (2023); Bradley Nurseries Huddersfield HD2 topographical, drainage and utility survey plan. Drawing number 0223-SIL-003 Rev A, February 2023; and
 - Information from Kirklees Council (private water abstractions and Local Wildlife Sites).

1.4 Limitations and assumptions

- 1.4.1 Opinions and recommendations presented in this report are based upon documents provided by third-party sources. It has not been possible to verify independently all third-party information and, for the purposes of this assessment, has assumed that such information is accurate and complete and has been used in good faith. Therefore, whilst this report and the opinions contained herein are accurate at the time of writing, liability cannot be accepted for any acts or omissions with the data or assessments or guarantee the completeness or accuracy of any descriptions or conclusions based on supplied third party

information.

- 1.4.2 Ground conditions can only be inferred between test locations and as such localised conditions on site may vary between sampling locations. Furthermore, observations made at the time of investigation and during monitoring visits may be subject to variation because of atmospheric, seasonal or other effects.
- 1.4.3 It is beyond the remit of the scope of works to assess the potential risks posed by any asbestos encountered/observed on site and advice should be sought by the Contractor from an asbestos specialist.
- 1.4.4 This report is intended to be used alongside current regulatory guidance, should the guidance be updated in the future, the following assessment may also need to be updated.
- 1.4.5 This report presents a risk assessment to assess potential contamination risks. Constraints relating to geotechnical (e.g. land instability), ecology, heritage, flooding/drainage, utilities, air quality and noise are beyond the remit of this report.
- 1.4.6 This report was prepared for Network Rail and for use solely by Network Rail. Thereafter, this report must not be relied upon, or transferred to any other parties without the express written consent of Network Rail. If an unauthorised third party comes into possession for this report, they rely on its contents at their own risk.

2. THE PROPOSED DEVELOPMENT

2.1.1 The site is located at the former Bradley Nurseries off Station Road, Bradley, Huddersfield at approximate National Grid Reference (NGR) 417149 420076. The location of the site and an indicative site layout is shown in the associated planning drawings submitted with the planning application and included in Appendix A.

2.1.2 The site will be used principally as a temporary construction compound to serve the TRU works between Huddersfield and Westtown (Dewsbury). Construction activities to service the wider Scheme will be undertaken from the site. There are two phases of use as a compound as summarised in the following paragraphs.

2.1.3 The works will comprise a number of elements:

- Use of the site as a temporary strategic construction compound;
- Retention of existing security fencing around the entire site (new fencing to be provided only if necessary and will match existing);
- Areas to be capped in a Type 1/6F aggregate (or similar) following a topsoil strip;
- Development of a car park for up to 25 spaces, plus two accessible;
- Installation of five welfare / office units (portacabin type temporary buildings);
- Installation of one security welfare unit and toilet;
- Use of the site as a temporary strategic construction compound;
- Localised cut and fill earthworks;
- Creation of internal roads (additional paving will be permeable unbound);
- Use as a bridge storage and assembly area;
- Storage areas; and
- Associated utilities/drainage work.

2.1.4 In terms of site drainage, The proposed development will utilise and retain where possible existing systems with installation of additional on-site drainage infrastructure. Appendix A provides a drainage plan of the proposed surface water drainage strategy of the Site. In summary, this includes provision of:

- a new carrier drain across the site to a flow control structure before discharge to an existing surface water sewer.
- Filter drains across the site to collect surface water runoff.
- Parking bays, footways and access roads constructed using permeable surfaces.
- Surface water exceedance to be directed to the material storage area for containment.

3. DESCRIPTION OF THE SITE

- 3.1.1 The site encompasses an area of approximately 1.23 hectares (ha) and is currently owned by Kirklees Council. Land has been temporarily acquired by Network Rail for the duration of its use as a compound.
- 3.1.2 A walkover survey was undertaken in January 2023 by JNP Group [1]. A walkover survey was also undertaken in May 2024 by Waterman Infrastructure & Environment Ltd. Key features identified from photographs are included in Table 3-1. A selection of photographs of the site are included in Appendix B.

Table 3-1 Summary of walkover

Item	Description
Current use	Disused.
Access	Access to site is via a gate located on the southern site boundary. Access to the gate is off Leeds Road. At the time of the JNP Group 2023 walkover survey, the gate was locked and partially blocked by sandstone boulders, preventing vehicular access.
Surfacing	The site surfacing comprises approximately: <ul style="list-style-type: none"> • 15% hardstanding (asphalt, concrete); • 40% bare soil / rubble; • 25% grass; and • 20% vegetation (shrubs, trees).
Topography	<p>The site elevation generally falls from west to east. The greatest level difference is located adjacent to the west of the existing access road which runs through the centre of the site, dividing the site into two plateaus.</p> <p>The western part of site is situated at a lower level to Leeds Road, with a steep slope from the road to the site. The western part of the site then slopes gently down to the steep slope in the centre of site.</p> <p>The northern part of the site is situated at a lower level to Station Road, with a steep slope from the road to the site. The eastern part of the Site is relatively level, with a steep slope present at the eastern and south – eastern site boundaries down to the adjacent land.</p> <p>Two gabion basket retaining walls are located in the south of the site, to the west of the access gate. Several low brick retaining walls are located in the west of the site, creating three terraced areas.</p> <p>During the ecology survey (undertaken on behalf of NR), it was identified that four small excavations were present at the site (covered over), indicating possible groundworks / works associated with utilities.</p>
Boundary type	Mesh wire fencing.
Potential sources of contamination	<ul style="list-style-type: none"> • Potential former above ground fuel tanks (two small concrete slabs present in the north of the site, two small slabs present in the centre of Site, square feature in the east of the site); and • Possible former generators/site plant (small building in the east of Site). Photos from the ecology walkover survey 2024 (undertaken on behalf of NR) indicate that the small building in the east of the site may have been a boiler house (gas fired).

Item	Description
Drainage	<p>According to the topographical, utility and drainage survey map (drawing no. 0223-SIL-003 Rev A, February 2023), a surface water sewer runs approximately north – west to south-east beneath the site. A manhole is present to the west of the small building in the east of the site. A manhole is present in the centre of the site adjacent to the access road, the topographical survey map shows that a surface water sewer runs north – west to the manhole.</p> <p>Photos from the ecology walkover survey 2024 (undertaken on behalf of NR) indicate that several areas of standing water / surface water pooling were present across the site.</p>

3.1.3 Surrounding land uses from on-line aerial images include:

- North – east: Church and graveyard, commercial businesses, industrial units and operational railway beyond;
- North – west: Residential properties and commercial businesses;
- South – east: Residential properties, beyond which is an operational railway, with industrial units and canal beyond; and
- South – west: Commercial businesses, industrial units and residential properties beyond.

4. ENVIRONMENTAL AND HISTORICAL SETTING

4.1.1 Based on data from the JNP Group Phase 1 report [1], the JNP Group Phase 2 report [2], the JNP Group Coal Mining Risk Assessment [3] and Kirklees Council, a summary of the historical and environmental setting of the site is presented in Table 4-1. The Groundsure report and historical maps which form part of the JNP Group Phase 1 report are provided in Appendix C and the Coal Authority Consultant Mining Report which forms part of the JNP Group Coal Mining Risk Assessment is included in Appendix D.

Table 4-1 Summary of environmental and historical setting within the site boundary

Item	Description (all dates and distances are approximate)
Key historical land uses on-site	<ul style="list-style-type: none"> • Site undeveloped (1854/1855– 1917); • Unreferenced building extends into the western part of site (1918 only); • Site undeveloped (1957 – 1959); • Large building in the east of site, with access track running to building from the western site boundary. Tank present adjacent to the east of the building (1989/1993 – 2021). Associated with the council nurseries; • Tracks, polytunnels/greenhouses and terracing shown in the north-west of site, overlapping site boundary (2003 – 2021) associated with nursery; and • Site appears vacant from 2023 mapping.
Key historical land uses off-site	<p>Key historical land uses within 250 m of the site boundary include:</p> <ul style="list-style-type: none"> • Small unreferenced buildings (potential residential use) and station house adjacent to the south (1893 – 2024); • Bradley Station 10 m south (1893 – 1918); • Tramway 50 m north-west (1893 – 1918); • Railway lines and cuttings (Bradley Junction) 10 m south (1893 – 2024); • Huddersfield Broad Canal 140 m south-east (1893 – 2024); • River Colne 162 m south-east (1893 – 2024); • Bowling green 73 m north (1907 only); • Church and graveyard 10 m north-east (1893 – 2024); • Unreferenced building on-site and extending to the west off site (1918 only); • Additional railway 190 m south (1918), listed as dismantled by 1985/1988; • Tank 50 m north (1930/1931 – 1951/1956); • Unspecified industry and tanks 60 m south-east (1957 – 2024); • Electricity substation 80 m south-west (1982/1986 – 2024); • Unspecified ground workings followed by spoil heap 80 m south (1930/1931 – 1985/1988); • Industrial estate 100 m south-west (1982/1986 – 2024) • Electricity substation 40 m north (1989/1993 – 1995); • Bradley Junction Industrial Estate 10 m south-west (1993 – 2024); and • Water treatment works 170 m south-east (2001 – 2024).
Published Geology	<p>Made Ground: No Made Ground is shown to be present on-site; however, Made Ground is anticipated to be present based on the historical development of the site. An area of Worked Ground shown to the south-east of the site in the positions of the railway lines and an area of Made Ground shown 65 m south.</p>

Item	Description (all dates and distances are approximate)
	<p>Superficial Deposits: No superficial deposits are mapped on-site. Alluvium deposits of clay, silt, sand and gravel are present off-site 140 m to the south-east.</p> <p>Bedrock: The Pennine Lower Coal Measures Formation (PLCM) comprising mudstone, siltstone and sandstone are mapped underlying the site.</p> <p>A coal seam outcrop is shown across the southern corner of site.</p> <p>The Coal Authority Consultants Mining Report shows a fault running in a north-east to south-west direction crossing the northern part of the Site.</p>
Mining	<p>Mine entries/adits: A coal mine entry is shown to approximately 40 m north-west to the site (ref. 417420-010). An adit is shown to be off-site to the south-east (approximately 50 m from the site), with a direction to the north-west, indicating that it passes beneath the southern corner of the site (ref. 417419-001).</p> <p>Probable or recorded shallow coal mine workings: Past underground mining of the Better Bed coal seam is recorded on-site at a depth of 9 m below ground level (bgl). No probable unrecorded shallow workings are recorded.</p> <p>Deep mine works: No deep mine workings are recorded within the site boundary.</p> <p>Brit Pits: None within site boundary. Two Brit Pits are present within 250 m of the site: 89 m south at Colne Bridge Colliery and 148 m north-east at Bradley Colliery.</p> <p>Surface ground workings: None within the site boundary. Unspecified ground workings were present approximately 80 m south between (1930/1931 - 1985/1988).</p>
Hydrogeology	<p>Superficial: N/A (superficial deposits are not indicated to be present underlying the site).</p> <p>Bedrock: Secondary A aquifer.</p> <p>Source Protection Zone (SPZ): None recorded within the site or within 250 m.</p> <p>Groundwater abstraction licences: None recorded on-site or within 250 m of the site.</p> <p>Private water supplies: None recorded within site or within 250m.</p> <p>Productivity: Productive bedrock aquifer.</p> <p>Groundwater Vulnerability: High vulnerability in bedrock aquifer.</p>
Surface Waters	<ul style="list-style-type: none"> • None on-site • Huddersfield Broad Canal - 140 m south-east. • River Colne 162 m south-east.

Item	Description (all dates and distances are approximate)
Sensitive ecological sites	<p>Huddersfield Broad Canal 140 m south is designated as a Local Wildlife Site (LWS).</p> <p>Green Belt located 199 m south-east. No other designated sites within 250 m of the site.</p>
Landfills and Waste	<p>Landfill: No active, recent or historical landfills recorded on-site. A historical landfill site is recorded 153 m south-east (Sludge Drying Beds, Colne Bridge, Bradley). The waste type is listed as industrial and liquid sludge. The licence issue is listed as September 1977, and the licence surrender is listed as April 1993.</p> <p>Licensed waste sites: None recorded on-site or within 250 m of the site.</p> <p>Waste exemption sites: Bradley Central Nursery treating waste exemption listed on-site (aerobic composting and associated prior treatment). Twelve waste exemption sites are listed within 250 m of the site. The nearest are 31 m south (storing waste and treating waste exemptions) for the storage and recovery of scrap metal and the sorting of storage of mixed waste.</p>
Pollution Controls	<p>None are present on-site. Within 250 m of the site, two licensed pollutant release sites are present (one active and one inactive). The licensed pollutant release site listed as active constitutes:</p> <ul style="list-style-type: none"> • Nationwide Crash Repair Centres Ltd (located approximately 117 m to the north – east). Permit type: Part B. <p>The one listed inactive is present approximately 29 m to the south.</p>
Trade Directory Entries	<p>None recorded on-site.</p> <p>The following are located within 250 m of the site:</p> <ul style="list-style-type: none"> • Turbocharge Service UK Ltd (engines), 199 m to the south-east; • Nationwide Crash Repair (vehicle repair, testing and servicing), 117 m to the north-east; and • Unspecified works 125 m south-east.
Fuel Stations	<p>None are recorded on-site or within 250 m of the site.</p>

5. HISTORICAL GROUND INVESTIGATION

5.1 Description of the investigation

- 5.1.1 An intrusive ground investigation was undertaken by JNP Group between 8 February 2023 to 24 March 2023 [2].
- 5.1.2 The ground investigation is summarised in Table 5-1 and the investigation locations are displayed on Drawing S11956-JNP-XX-XX-DR-G-700 P03 in Appendix A. Based on an updated site boundary, some ground investigation locations are now off-site.

Table 5-1 Summary of 2023 investigation

Item	No. undertaken
Number of boreholes	Six dynamic sampling boreholes drilled to 4.0 – 5.0 m bgl. Six cable percussive boreholes drilled to 5.0 m – 9.0 m bgl. Four rotary open-hole boreholes drilled to 7.0 – 30.0 m bgl.
Number of trial pits	Three trial pits excavated to 2.2 – 2.3 m bgl. Eight trial trenches excavated to 0.8 – 3.2 m bgl.
PID* testing undertaken	None
Number of soil samples tested	24
Number of samples tested for soil-leachate	Seven
Number of groundwater samples tested	None
Gas monitoring rounds	Six (from March 2023 – June 2023) on 12 monitoring wells.
* photo-ionisation detector	

- 5.1.3 Chemical analysis of environmental samples collected during investigations was scheduled by JNP Group and tested by i2 Analytical Testing Services. Table 5-2 summarises the soil and soil-leachate samples analysed for selected determinands from within the site boundary.

Table 5-2 Testing suites

Determinand/Suite	Number of samples tested
Metals/Metalloids (antimony, arsenic, beryllium, boron (water soluble), cadmium, chromium (total) copper, lead, mercury, nickel, selenium, vanadium and zinc).	15
Speciated polycyclic aromatic hydrocarbons (USEPA 16) (PAH)**, total PAHs-16MS.	15
BTEX (benzene, toluene, ethylbenzene, m and p xylene and o xylene) and Methyl Tert Butyl Ether (MTBE).	12
Speciated total petroleum hydrocarbons (TPH) criteria working group (CWG) with aliphatic/aromatic separation and carbon banding, Total Aliphatics, Total Aromatics.	12
Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs).	5
Asbestos screen.	17
Soil Organic Matter (SOM).	11
Two-Stage Waste Acceptance Criteria (WAC) test (tested on soil and soil-leachate).	7

5.1.4 Three samples tested for speciated PAHs, metals/metalloids, BTEX, MTBE and speciated TPHs were classified as deviated as no sample date was provided on the sample containers. Four samples were listed as deviated for BTEX, MTBE and speciated TPHs testing and one sample was listed as deviated for BTEX, MTBE, speciated PAHs and TPHs testing due to insufficient containers being used.

5.2 Ground conditions encountered

5.2.1 Table 5-3 summarises the ground conditions encountered during the ground investigation.

Table 5-3 Summary of ground conditions

Geological Unit	General description	Range of depths to top of Unit (mbgl)	Range of depths to base of Unit (mbgl)
Topsoil	Brown gravelly/sandy/clayey TOPSOIL. Recorded in WS04 and WS06 only.	0.0	0.1
Made Ground – granular*	Brown variably gravelly/clayey SAND comprising sandstone/mudstone/limestone. Yellow sandy GRAVEL comprising sandstone/limestone. Plastic sheets encountered beneath the Made Ground in TR01, TR01A, TR01B, TR01C and TR04. Black/brown ashy sandy GRAVEL recorded in CP04 only. Black ashy sandy CLAY recorded in TR01A only. Slightly gravelly SAND of mudstone and brick recorded in WS01 only.	0.0 - 0.1	0.15 - 0.3
Made Ground – cohesive*	Soft to firm consistency brown variably gravelly/sandy/silty CLAY. No anthropogenic material recorded in the Made Ground descriptions provided. Strata noted to be black in CP05, TR03 and TR04.	0 - 0.2	0.2 – 1.5
Gravel / Sand (potential)	Variably sandy/silty/clayey GRAVEL of mudstone and/or sandstone. Recorded in WS01 and WS03 only.	0.1 - 2.2	0.24 - 5.0 (end of the borehole)

Geological Unit	General description	Range of depths to top of Unit (mbgl)	Range of depths to base of Unit (mbgl)
completely weathered PLCM)	Brown gravelly SAND. Recorded in SK01 and SK03 only. Potential completely weathered PLCM.		
Clay (potential completely weathered PLCM)	Firm to stiff consistency variably gravelly/sandy/silty CLAY. Potential completely weathered PLCM.	0.1 - 1.5	2.0 - 5.0 (end of borehole)
Pennine Lower Coal Measures (PLCM)	COAL. Recorded in CP05 and RH01 only.	2.5 - 8.0	3.3 - 8.6
Pennine Lower Coal Measures (PLCM)	Grey/black/dark brown MUDSTONE. Described as very weak in WS05. MUDSTONE with sandstone bands recorded in RH01 between 17.0-30.0 m bgl. Grey SANDSTONE recorded in RH01 between 13.5-17.0 m bgl. Grey SANDSTONE with mudstone bands recorded in RH04 between 15.0-23.0 m bgl.	1.5 - 17.0	5.0 - 30.0 (end of the borehole)
*Made Ground described as 'Fill' in RH02 and RH03 therefore cannot be classified as granular or cohesive. Tarmacadam recorded in RH04 between 0-0.4 m bgl.			

- 5.2.2 Trial trenching was not undertaken by JNP Group directly over the location the mine shaft (ref. 417420-010) mapped off-site to the north-west of the site due to the position of a culvert and dense vegetation/trees. No evidence of the mine shaft was identified during the trial trenching undertaken in the vicinity of the area. The JNP Phase II Report [2] includes reference to a ground investigation undertaken by Curtins in 2017 whereby the mine shaft was located on the boundary of the site, further to the south-west than the position mapped in the Coal Authority Consultants Mining Report (Appendix D). No information is provided regarding treatment of the mine shaft.
- 5.2.3 Evidence of shallow workings were recorded during the investigation undertaken by JNP Group. Broken ground and poor returns were identified in rotary borehole R03 between 4.0 m to 14.2 m bgl and a void was encountered between 14.2 m bgl to 14.6 m bgl. In addition, a void between 5.2 m to 5.8 m bgl was encountered in rotary borehole RH04. No ground investigation work was undertaken by JNP Group and in relation to the adit (ref. 417419-001). The summary of the Curtins 2017 ground investigation within the JNP Group Phase II Report [2] states that the scope of ground investigation undertaken did not include locating the adit.
- 5.2.4 Groundwater levels were monitored on six occasions between 15 March 2023 to 8 June

2023. The groundwater levels recorded are summarised Table 5-4.

Table 5-4 Summary of groundwater levels during 2023 monitoring

Exploratory hole	Well screen range (m bgl)	Screened deposits	Depth to water (range in m bgl)
WS01	1.0 – 5.0	Gravel	Surface – 5.0
WS02	1.0 – 5.0	Clay	1.9 – 5.0
WS03	1.0 – 5.0	Clay, gravel	0.6 – 3.72
WS04	1.0 – 4.0	Clay	4.0 – 5.0
WS05	1.0 – 3.0	Clay	2.95 – 3.0
WS06	1.0 – 4.0	Clay	2.7 – 3.0
CP01	1.0 – 8.0	Clay and PLCM: (mudstone)	5.7 – 8.0
CP02	1.0 – 4.7	Made Ground, clay and PLCM (mudstone)	3.21 – 4.7
CP03	1.0 – 5.5	Clay and PLCM (mudstone)	5.5 – 5.5
CP04	1.0 – 5.0	Clay and PLCM (mudstone)	4.9 – 5.0
CP05	1.0 – 5.0	Clay and PLCM (mudstone, coal)	Surface – 5.0
CP06	1.0 – 6.0	Clay and PLCM (mudstone)	5.95 – 6.0

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

Table 5-5 Summary of anthropogenic materials observed within the logs

Exploratory Hole	Depth (m)	Comment	Strata
WS01	0.0 – 0.1	Brick fragments.	Made Ground
RH04	0.0 – 0.4	Tarmacadam.	
TR01	0.3	Plastic sheet.	
TR01A	0.3		
TR01B	0.3		
TR01C	0.2		
TR04	0.1		
TR01A	0.2 – 0.5	Ash inclusions	
CP04	0.0 – 0.3		
SK02	0.7	Concrete block.	Clay

- 5.2.6 No visual/olfactory evidence of VOCs was observed during the investigations undertaken.
- 5.2.7 Table 5-6 details the minimum oxygen concentrations, the maximum and steady state concentrations for methane and carbon dioxide, and flow rates recorded for each borehole during monitoring rounds.
- 5.2.8 The full results of the gas monitoring are presented within the JNP Phase II Report presented in Appendix E.

Table 5-6 Summary of ground gas monitoring undertaken at the site

Exploratory hole	Well screen range (m bgl)	Screened Deposits	Flow (l/hr)		Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Was entire RZ flooded? (No. visits)
			Max	Max Steady	Max	Max Steady	Max	Max Steady	Min	Min Steady	
CP01	1.0 – 8.0	Clay and PLCM: (mudstone)	0.0	0.0	0.2	0.2	3.5	1.8	10.5	10.5	Yes (1)
CP02	1.0 – 4.7	Made Ground, clay and PLCM (mudstone)	0.0	0.0	0.2	0.1	1.9	1.9	4.5	4.5	No
CP03	1.0 – 5.5	Clay and PLCM (mudstone)	0.0	0.0	0.1	0.1	3.1	2.1	1.2	4.5	No
CP04	1.0 – 5.0	Clay and PLCM (mudstone)	0.6	0.6	0.2	0.1	6.7	6.6	0.1	0.1	No
CP05	1.0 – 5.0	Clay and PLCM (mudstone, coal)	0.0	0.0	0.0	0.0	4.4	4.4	<i>0.0</i>	<i>0.0</i>	Yes (2)
CP06	1.0 – 6.0	Clay and PLCM (mudstone)	0.0	0.0	0.1	0.1	3.2	2.1	1.6	8.7	No
WS01	1.0 – 5.0	Gravel	0.0	0.0	0.2	0.1	2.2	1.9	17.8	17.8	Yes (4)
WS02	1.0 – 5.0	Clay	0.0	0.0	0.1	0.1	4.6	4.6	0.0	4.3	No
WS03	1.0 – 5.0	Clay, gravel	0.0	0.0	0.1	0.1	5.0	5.0	4.2	4.2	Yes (1)
WS04	1.0 – 5.0	Clay	0.0	0.0	0.2	0.2	6.5	6.5	5.2	5.2	No
WS05	1.0 – 3.0	Clay	0.0	0.0	0.0	0.0	4.5	4.5	2.0	2.0	No
WS06	1.0 – 3.0	Clay	0.0	0.0	0.0	0.0	7.3	7.3	<i>0.0</i>	<i>0.0</i>	Yes (3)

Footnote: PLCM = Pennine Lower Coal Measures
v/v = volume/volume
ppm = parts per million
m bgl = metres below ground level
l/hr = litres per hour
Bold Text = maximum recorded values for gas concentrations and flow
Italic Text = minimum oxygen concentration recorded

5.3 Summary of risk assessment undertaken by JNP Group

- 5.3.1 The soil testing results were screened by JNP Group and a human health risk assessment was undertaken [2]. A limited controlled waters risk assessment was undertaken based on the soil testing results. The results of the six rounds of gas monitoring were used to undertake a ground gas risk assessment for the site. JNP Group undertook the human health and ground gas risks assessments based on a commercial end-use.
- 5.3.2 The soil testing results were screened against Category 4 Screening Levels (C4SLs) [4] and LQM Suitable for Use Levels (S4ULs) [5] generic assessment criteria (GAC) under a commercial end-use scenario and a soil organic matter content of 1%. No exceedances were recorded. All BTEX, MTBE, VOC and SVOC (except for speciated PAHs) compounds were recorded as below the limits of detection (LOD). Asbestos was not detected in the samples screened for asbestos. JNP Group concluded that the concentrations of contaminants in the soils tested do not pose a significant risk to human health receptors, based on a commercial end-use.
- 5.3.3 Groundwater samples were not collected as part of the JNP Group monitoring works and soil leachate tests were not undertaken (except for leachate tests as part of the two-stage Waste Acceptance Criteria tests). JNP Group discounted the PLCM secondary A bedrock aquifer as a potential controlled waters receptor on the basis that no abstractions within 250 m of the site have been identified. The controlled waters receptors were therefore considered to be the Huddersfield Broad Canal and River Colne. The soil testing results were screened against DEFRA Environmental Quality Standards (EQS) [6]. JNP Group state that no highly mobile organic contaminants (such as BTEX, naphthalene and lighter TPH fractions) were identified and that the concentrations of contaminants in the soils tested do not pose a significant risk to controlled waters receptors.
- 5.3.4 The gas monitoring data was used to calculate Gas Screening Values (GSVs) for the twelve boreholes monitored using the flow rates and the maximum concentrations of methane and carbon dioxide recorded. The GSVs range between 0.0031 l/h to 0.013 l/h which fall within the Characteristic Situation (CS) 1 designation [7]. However, JNP Group concluded that due to elevated carbon dioxide concentrations recorded (above 5% v/v) in WS03, WS04, WS05 and CP04, the site should be classified as CS 2 and ground gas protection measures will be required in proposed buildings (based on proposed development assessed by JNP Group).
- 5.3.5 The cohesive deposits recorded during the JNP Group ground investigation are anticipated to limit the migration of gas from the shallow coal mine workings and the off-site historical landfill. The temporary cabins which are proposed to be located on the site (portacabins or similar) are likely to have a void between the floor and ground. Providing the gap beneath the cabins is maintained, the ingress of gas/vapours is unlikely to be sufficient to pose an unacceptable risk to the cabin occupants. As only temporary cabins are proposed to be used on the site (with likely void between the floor and the ground), the CS 2 classification is not considered to apply to the proposed development as the guidance applies to permanent structures. Furthermore, the detailed mine gas risk assessment requirement within CL:AIRE guidance [8] is not considered to apply to the site as permanent structures are not proposed.

6. INITIAL CONCEPTUAL SITE MODEL

6.1 Introduction

- 6.1.1 Primary guidance for assessing and managing risks posed by land contamination is presented in Land Contamination: Risk Management (LCRM) published by the Environment Agency [9]. LCRM provides a technical framework (and signposts other key guidance) for identifying and remediating contamination through the application of a risk management process. The question of whether a risk is unacceptable in any particular case involves not only scientific and technical assessments, but also appropriate criteria by which to judge the risk and conclude exactly what risk would be unacceptable.
- 6.1.2 An initial conceptual site model (CSM) describes the relationship between potential sources of contamination (resulting from both on-site and off-site historical and recent activities) and receptors to the potential contamination.
- 6.1.3 As part of the CSM development, three elements are identified and assessed:
- Source of contamination and associated contaminants;
 - Receptors – human beings, controlled waters (surface water/groundwater), ecological systems and property, to that contamination; and
 - Pathways between the sources and receptors.
- 6.1.4 Where all three elements are present or are likely to be present, they are described as potential contaminant linkages (PCLs), which can then be subjected to the risk assessment and risk management process.
- 6.1.5 The risk assessment methodology has been provided within Appendix F.

6.2 Potential contamination sources

- 6.2.1 Based on review of the available information, the following contaminative sources have been identified within the site boundary and within 250 m of the site boundary:

On-site contamination sources

- Made Ground associated with former developments on – site (former unreferenced building, former plant nursery and associated infrastructure); and
- Historical on – site uses including:
 - Former unreferenced building in the western part of the site; and
 - Former use of the site as a plant nursery (building in the eastern part of site, access road in the centre of site, polytunnels/greenhouses in the western part of site, potential above ground fuel tanks and potential former generators/site plant).
- Shallow coal seams and coal mine workings
 - Potential source of ground gas.

Off-site contamination sources

- Historical features surrounding the site including:
 - Bradley Station;
 - Bowling green, tank 50 m north, electricity substation 40 m north, unspecified industry and works; and
 - Colne Bridge Colliery and Bradley Colliery (potential shallow coal mining shaft and adit off-site).

- Current features surrounding the site include:
 - Railways;
 - Industrial estates (including an engine works and a vehicle repair, testing and servicing business), water treatment works, unspecified works (including tanks); and
 - Electricity substation.
- Historical landfill 153 m south – east of the site (operational 1977 – 1993).

- 6.2.2 Potential contaminants associated with the above sources include metals and metalloids, asbestos containing materials (ACM), inorganic compounds (cyanides, sulphate, ammonia), TPHs, PAHs, BTEX, MTBE, VOCs and SVOCs. Although it is unlikely there will be a significant source of BTEX, MTBE, VOCs and SVOCs on - site, these contaminants have been included as potential on - site contaminants as the contents of the former tank is unknown.
- 6.2.3 As the site was previously used as a plant nursery, there is the potential for the former use of pesticides and herbicides. The potential use of pesticides and herbicides is considered to be limited given the small scale of the plant nursery and any use is likely to have been targeted, rather than machine spread which is more likely to occur in an agricultural setting. Pesticides and herbicides have therefore not been included as potential contaminants in this risk assessment.
- 6.2.4 Given that the electricity substations identified within 250 m of the site are present on mapping from 1982/1986 and onwards, it is considered that the use of Polychlorinated Biphenyls (PCBs) is unlikely. Furthermore, assuming ongoing maintenance and hardstanding ground cover, the potential for any contaminants reaching the site is considered unlikely and PCBs have therefore not been included in this assessment.
- 6.2.5 There is also potential for ground gases (methane, carbon dioxide, hydrogen sulphide, carbon monoxide) from varying sources including the historical shallow coal mine workings on-site, Made Ground on- site, off-site landfill and potentially infilled ground.

6.3 Potential receptors

- 6.3.1 The following receptors have been identified based on the indicative site layout shown in the associated planning drawings (Appendix A):
- Human health:
 - On-site: Construction workers associated with the construction of the site and workers utilising the temporary strategic construction compound of the wider TRU Scheme; and
 - Off-site: Residents and occupiers of commercial/industrial premises, use of public open space areas.
 - Controlled waters:
 - Groundwater: Bedrock secondary A aquifer; and
 - Surface water: Huddersfield Broad Canal 140 m south-east, River Colne 162 m south-east.
 - Property:
 - On-site: construction compound buildings (offices, welfare, canteen, stores, etc.); and
 - Off-site: commercial businesses and residential properties.
 - Ecological:
 - Huddersfield Broad Canal LWS.

6.4 Potential pathways

6.4.1 Considering the identified receptors, a number of pathways are considered plausible based on the available information.

- Human health:
 - Ingestion of contaminated soils, soil-derived dust and groundwater;
 - Inhalation of soil and soil-derived dust, ground gases, and soil and groundwater derived vapours;
 - Dermal contact with soil, soil derived dust and groundwater; and
 - Inhalation of organic vapours (e.g. from fuel spills) and ground/mine gas.
- Controlled waters:
 - Leaching or dissolution of contaminants in unsaturated soils and subsequent migration;
 - Lateral and vertical migration through permeable deposits in Made Ground and bedrock (e.g. sandstone and/or highly fractured rock);
 - Migration of groundwater to the Huddersfield Broad Canal and River Colne;
 - Migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams, mine entry offsite; and
 - Surface water run-off.
- Property:
 - Ground gas migration and build up within confined spaces; and
 - Potable water pipes.
- Ecological:
 - Contact/absorption of contaminants by flora/fauna in Huddersfield Broad Canal LWS.

6.4.2 Surface water run-off has been discounted as a possible pathway to the surface water receptors due to the distances from site (>140 m south-east).

6.4.3 Below ground potable water pipes may require a water pipe assessment if they are to be installed to the site cabins. As the proposed location of these pipes is not currently known they have not been considered within this assessment.

6.4.4 Details of the potential contaminant linkages and associated risks are recorded in Table 6-1.

Table 6-1 Conceptual Site Model and Risk Assessment (Use of the Site as a strategic construction compound)

Source	Pathway	Receptor	Risk classification and justification
<p><u>Potential on-site contamination:</u></p> <p>Made Ground associated with former developments.</p> <p>Historical on-site uses including unreferenced building, plant nursery, tank (see section 6.2 for full list).</p> <p>Metals, asbestos, inorganic compounds (cyanides, sulphate), TPHs, PAHs, BTEX, MTBE, VOCs and SVOCs.</p> <p>Ground/mine gas associated with historical shallow coal mine workings on-site and Made Ground.</p>	<p>Ingestion of contaminated soils, soil-derived dust and groundwater</p> <p>Inhalation of soil and soil-derived dust, asbestos and soil and groundwater droplets</p> <p>Dermal contact with soil, soil derived dust and groundwater</p>	<p>On-site users (construction workers involved in the construction of the site and TRU workers utilising the temporary strategic construction compound).</p> <p>Property (gas only)</p>	<p><u>Construction workers</u> (Medium/Low Likelihood) Moderate/Low Risk</p> <p>Construction workers are likely to be in contact with the underlying soils at the site when undertaking excavations (e.g. for cut and fill earthworks, installation of new services) for the construction compound. No asbestos was detected in the samples analysed as part of the JNP Group ground investigation, no contaminants exceeded relevant screening criteria and no visual/olfactory evidence of significant contamination was identified. However, there is potential for unexpected contamination/unexpected ground conditions in areas not investigated.</p> <p>The Contractor has a duty under health and safety legislation to assess the risks posed to its workforce from contamination/asbestos and will implement the appropriate mitigation measures, which should minimise the potential risks.</p> <p><u>TRU workforce using compound</u> (Medium/unlikely) Low Risk</p> <p>The car parks, locations where the cabins are situated and storage areas will be covered in hardstanding or stone during the site preparation works, which would minimise the risk of contact with underlying Made Ground.</p>
	<p>Inhalation of ground/mine gas and vapours (e.g. from historical fuel spills)</p> <p>Migration along service trenches and build up within confined spaces (explosion or asphyxiation)</p>		<p>(Severe/unlikely) Moderate/Low Risk</p> <p>Installation of new services (e.g. drainage) has the potential to introduce new migration pathways to the welfare cabins. Cohesive deposits underlying the Made Ground identified in the majority of the investigation locations will likely limit the migration of gas. The cabins (portacabins or similar) will have a void between the floor and ground. Providing the gap beneath the cabins is maintained, the ingress of gas is unlikely to be sufficient to pose an unacceptable risk to the cabin occupants.</p>
	<p>Ingestion of contaminated soils, soil-derived dust and groundwater</p> <p>Inhalation of soil and soil-derived dust, asbestos, soil and groundwater droplets</p> <p>Dermal contact with soil, soil derived dust and groundwater</p>	<p>Off-site residents, occupiers of commercial/industrial premises, users of areas of public open space.</p> <p>Property (gas only)</p>	<p>(Medium/Unlikely) Low Risk</p> <p>If dust control measures are implemented correctly (in line with industry good practice) when Made Ground is disturbed, the risk to off - site receptors should be negligible. Once the construction of the temporary Scheme compound has been completed, hardstanding, stone and vegetation are likely to cover the site minimising the risk of wind entrainment of dust.</p> <p>It is considered unlikely that occupiers of surrounding properties/areas of public open space would encounter groundwater.</p>
	<p>Inhalation of ground gases/mine gas and vapours.</p> <p>Ground gas migration and build up within confined spaces (explosion or asphyxiation)</p>		<p>(Medium/Low Likelihood) Moderate/Low Risk</p> <p>Installation of new services (e.g. drainage, water supply pipes) has the potential to introduce new migration pathways to off - site buildings/occupiers via trench backfill. This risk should be considered during design.</p>
	<p>Leaching of contaminants and migration.</p> <p>Migration through permeable Made Ground</p> <p>Migration through the bedrock</p> <p>Migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams</p> <p>Contact/absorption of contaminants by flora/fauna in LWS</p>	<p>Groundwater – Secondary A bedrock aquifer (Pennine Lower Coal Measures)</p>	<p>(Medium/Low Likelihood) Moderate/Low Risk</p> <p>No superficial deposits are recorded underlying site therefore there is the potential for a direct pathway for contaminant migration from the Made Ground into the underlying bedrock aquifer. However, no elevated contaminants were identified in the soil samples tested during the JNP Group ground investigation and no significant sources of mobile contamination were identified (limited anthropogenic material identified within the Made Ground, refer to Table 5-5). Cohesive deposits underlying the Made Ground identified in the majority of the investigation locations will likely limit the migration of any mobile contamination. Furthermore, the site is not located within a groundwater Source Protection Zone and no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.</p>
		<p>Surface water – Huddersfield Broad Canal</p>	<p>(Medium/Unlikely) Low Risk</p>

Source	Pathway	Receptor	Risk classification and justification
		(140 m to the south-east) LWS and River Colne (162 m south- east)	Huddersfield Broad Canal is likely to be sealed with puddle-clay, which would restrict the ingress of groundwater. Given the distances of the surface water receptors from the site, the only migration pathways considered to be viable are the migration of contaminants within groundwater (secondary A bedrock aquifer). Unspecified industry (including tanks) and a water treatment works are situated adjacent to the surface water receptors to the south-east of site, which are considered to be a greater source of potential mobile contamination than the site. It is unlikely that the use of the site as a construction compound would pose an unacceptable risk to these surface water receptors and the LWS.
<u>Potential off-site contamination:</u> Historical landfill 153 m south and potentially infilled features Variety of activities detailed in section 6.2. Key land uses include railways, works (including an engine works and a vehicle repair, testing and servicing business, unreferenced works with tanks). Historical coal mining within the surrounding area, including adit and mine shaft. Metals, asbestos, inorganic compounds (cyanides, sulphate, ammonia), TPHs, PAHs, BTEX, MTBE, VOCs and SVOCs.	Inhalation, ingestion and dermal contact with contaminants in soil derived dust	On-site users (construction workers involved in the construction of the site and TRU workers utilising the temporary strategic construction compound).	(Medium/Unlikely) Low Risk The majority of the surrounding area is covered in hardstanding or vegetated, therefore exposure to the underlying Made Ground is limited and it is considered unlikely that contaminants would migrate onto Site through windblown dust.
	Inhalation of vapours/gas migrating through unsaturated zone and disassociating from migrating groundwater	On-site users (construction workers involved in the construction of the site and TRU workers utilising the temporary strategic construction compound). On-site property (gas only) Off-site residents, occupiers of commercial/industrial premises, users of areas of public open space and property (gas only)	(Severe/Unlikely) Moderate/Low Risk A historical landfill is located 153 m south and there is evidence of off-site coal mining (collieries) which are potential sourced of hazardous/ground gas. Cohesive deposits underlying the Made Ground identified in the majority of the investigation locations will likely limit the migration of gas and the cabins (portacabins or similar) are likely to have a void between the floor and ground. Providing the gap beneath the cabins is maintained, the ingress of gas/vapours is unlikely to be sufficient to pose an unacceptable risk to the cabin occupants. Installation of new services (e.g. drainage) has the potential to introduce new migration pathways that might re-direct migration of gas and this should be considered during design.
	Leaching of contaminants and migration. Migration through permeable Made Ground Migration through the bedrock Migration via preferential pathways e.g. existing and historical pipes and services, shallow worked coal seams.	Groundwater – Secondary A bedrock aquifer (Pennine Lower Coal Measures)	(Medium/Low) Moderate/Low Risk No former contaminative land uses have been identified adjacent to the site. Current industrial land uses are located greater than 100 m from the site. Given that the bedrock in the surrounding area is also mapped as Pennine Lower Coal Measures (sandstone, siltstone and mudstone), the permeability is anticipated to be variable. A low likelihood of off-site contamination migrating towards the site and impacting the secondary A bedrock aquifer is considered appropriate given the distance of the potentially contaminative off-site land uses. Any cohesive deposits present between the Made Ground and bedrock will limit migration of contaminants. Furthermore, no groundwater abstraction licenses or private water supplies are recorded within 250 m of the site.

7. CONCLUSIONS AND RECOMMENDATIONS

- 7.1.1 The CSM presented in Section 6 comprises the decision record for this stage of risk assessment. The LCRM guidance [9] states that confirmed contaminant linkages become Relevant Pollutant Linkages (RPLs). For the purposes of this report, RPLs are considered those where the risk level in the CSM is higher than Moderate/Low and some form of mitigation before or during construction is considered likely to be required. Based on the CSM, no RPLs have been identified.
- 7.1.2 Table 7-1 presents the key findings of the ground investigation and assessments, together with the associated constraints and the further works or mitigation procedures, if required.
- 7.1.3 The risk assessment presented in previous sections and the conclusions/recommendations presented in Table 7-1 are based on the development described in Section 2 of this report. If the design/layout subsequently changes then the revised CSM, the risk assessment and Table 7-1 must be reviewed and if necessary revised by a contamination and ground/mine gas specialist.

Table 7-1 Contamination Constraints and Recommended Actions Before/During Construction and Demobilisation of compound

Item	Findings of Initial Assessments	Implications to redevelopment
Aggressive ground conditions and buried concrete and drainage pipes	<p>Geotechnical tests on soils (ground aggressivity suite) and contamination tests were undertaken as part of the JNP Group investigation.</p> <p>An assessment has not been undertaken as this is beyond the scope of this report.</p>	<p>Risk assessments should be undertaken during design to confirm the concrete class and the requirements for drainage / water supply pipes.</p>
Re-use of site won arisings within the site boundary or elsewhere within TRU Scheme (excluding ballast)	<p>A topsoil strip is proposed as part of the works at the site. Topsoil was recorded to 0.1 m bgl in two locations during the JNP Group ground investigation. The depth/presence of topsoil across the remainder of the site where intrusive investigation has not been carried out is unknown. The JNP Group risk assessment states that no samples recorded chemical concentrations exceeding relevant human health criteria. No leachate tests or groundwater samples were obtained for testing as part of the ground investigation.</p> <p>No visual/olfactory evidence of significant contamination was identified during the JNP Group ground investigation.</p> <p>Following consideration of the potential contaminant linkages it is considered the re-use of site-won arisings on the site is unlikely to pose an unacceptable risk to human health, with the enforcement of appropriate controls.</p>	<p>Re-use criteria will be derived for the TRU Scheme that will consider the potential risks that might be posed if design requires the placement of materials nearer to surface water features and/or over granular superficial deposits.</p> <p>If soils are proposed to be re-used on-site, leachate tests should be undertaken to determine whether they potentially pose an environmental risk. The leachate results should be compared to suitable acceptability criteria, and where the criteria are exceeded, DQRA may be required to derive site-specific criteria to determine whether the soils are suitable for use.</p> <p>Regardless of where materials are re-used on the site or elsewhere within the TRU Scheme, it will be subject to compliance with requirements of a materials management plan (MMP) or environmental permit. Verification that re-use complied with the MMP/permit would be required, accordingly materials should be tested and compared to re-use criteria (developed for the TRU Scheme). It is recommended this approach is agreed with the contaminated land officers at the Council and Environment Agency <u>prior</u> to submission of the MMP/permit.</p>
Gas risk	<p>The JNP Group investigation involved six rounds of gas monitoring. Carbon dioxide concentrations were recorded between 1.8 % v/v to 7.3 % v/v,</p>	<p>The cabins (portacabins or similar) will require a void to be present between the floor and ground. This requirement has been checked with the contractor and it is possible for the cabins to be installed with this void. Providing the gap</p>

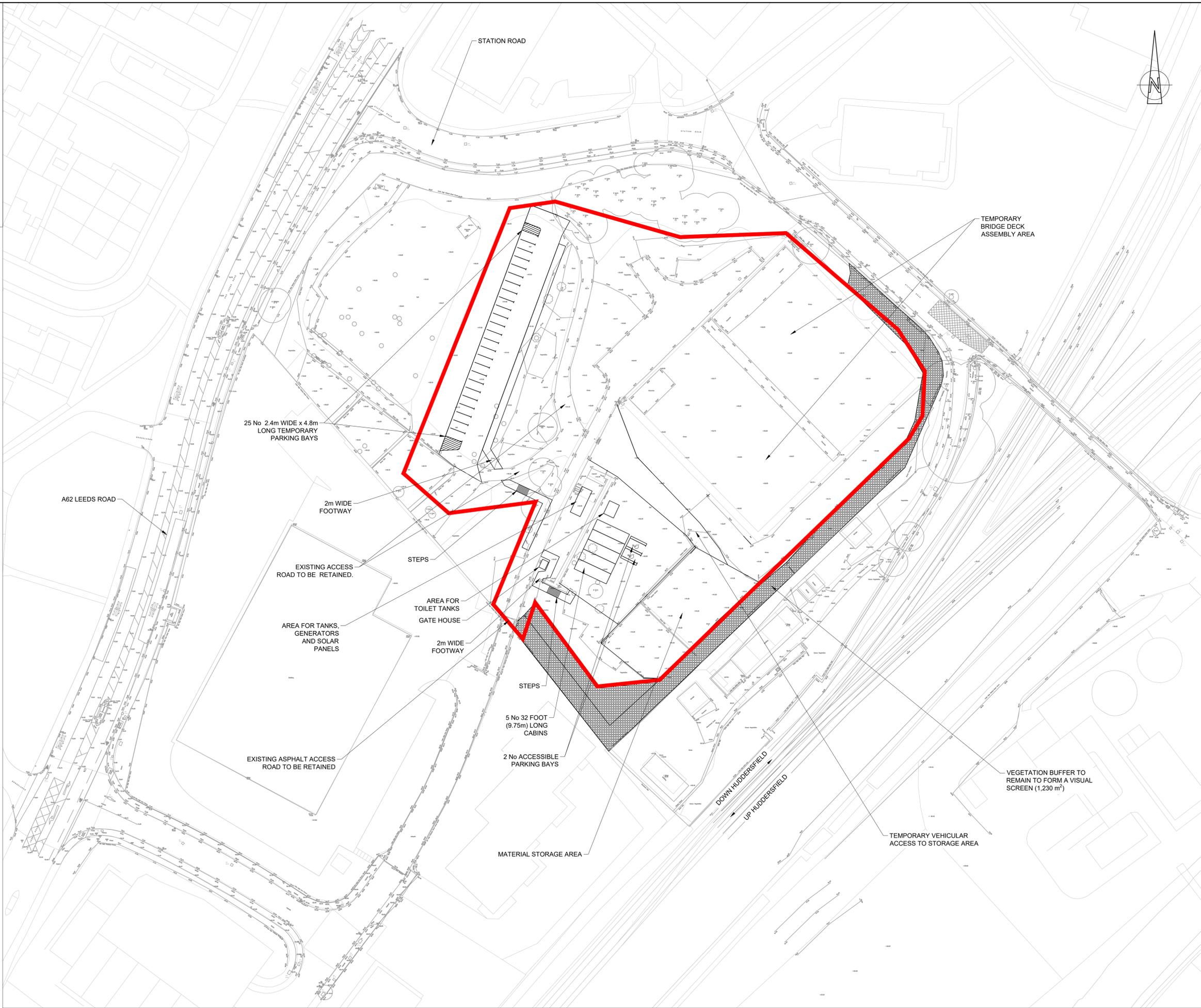
Item	Findings of Initial Assessments	Implications to redevelopment
	<p>methane concentrations were recorded as 0 % v/v and flow rates were all recorded as 0 l/h except from one flow rate of 0.6 l/h. The GSVs calculated classified the site as Characteristic Situation (CS) 1. JNP Group's risk assessment states that due to the elevated carbon dioxide concentrations recorded, the site should be classified as CS 2.</p> <p>Shallow coal mine workings were identified through rotary drilling and a mine shaft off-site in the north-west. The shallow worked coal seams, mine shaft and possible adit (also found off-site) pose a mine gas risk.</p>	<p>beneath the cabins is maintained, the ingress of gas is unlikely to be sufficient to pose an unacceptable risk to the cabin occupants.</p> <p>Should office / welfare structures be constructed whereby foundations / ground slabs are laid (not currently proposed), a detailed mine gas assessment would be required to be undertaken according to 2021 CL:AIRE guidance [8].</p>
Drainage – risks to controlled waters	Leachate testing not undertaken as part of the JNP Group investigation.	It is unlikely that the use of the site as a construction compound would pose an unacceptable risk to groundwater. However the contractor will ensure that adequate assessment of risk from the proposed drainage strategy i.e. attenuation on site during a flood event, is considered prior to the drainage system being brought into use.
Disposal of waste soils and Made Ground.	<p>Seven Waste Acceptance Criteria (WAC) tests were undertaken as part of the JNP Group investigation. The results of the WAC tests cannot be used for landfill designation without a waste assessment being undertaken on the soil results.</p> <p>A waste assessment has not been undertaken to date to classify the material tested as hazardous or non-hazardous.</p>	<p>It is the responsibility of the waste producer to ensure that adequate sampling/analysis is undertaken to allow waste classification in accordance with waste regulations/guidance.</p> <p>Waste assessment is likely to be required to achieve this.</p> <p>It is recommended that the contractor discusses laboratory results and soil descriptions with a variety of landfill operators/soil recycling operators to confirm options.</p>
Unexpected Contamination	N/A	As with any development there is always the possibility of finding ground/gas/contamination conditions that vary from those recorded in the ground investigation. Construction team should be vigilant and if such is encountered, to stop work in that area and seek advice from contamination

Item	Findings of Initial Assessments	Implications to redevelopment
		specialists and inform the planning authority. Further sampling and assessment might be required to evaluate the risk.
Decommissioning monitoring wells	N/A	Prior to construction, all monitoring wells should be decommissioned in accordance with the Environment Agency's guidance "Good Practice for Decommissioning Redundant Boreholes and Wells" dated October 2012 [10]. This is to prevent the wells from becoming damaged during construction and inadvertently becoming pollution or gas migration pathways.

8. REFERENCES

- [1] JNP Group, "Phase I Geo-environmental Report (Reference S11956-JNP-XX-XX-RP-G-1004 P02)," 2023.
- [2] JNP Group, "Phase II Geo-environmental Report (Reference S11956-JNP-XX-XX-RP-G-1005 P03)," 2023.
- [3] JNP Group, "Coal Mining Risk Assessment (Reference S11956-JNP-XX-XX-RP-G-1002)," 2023.
- [4] DEFRA, "SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination," Contaminated Land: Applications in Real Environments, 2014., 2014.
- [5] L. Q. M. & C. I. o. E. Health, "The LQM/CIEH S4UL for Human Health Risk Assessment - LQM CIEH," 2015.
- [6] DEFRA, "PB14163. Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environments," 2014.
- [7] B. S. Institute, "BS 8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings," 2019.
- [8] CL:AIRE, "Good Practice for Risk Assessment for Coal Mine Gas Emissions," 2021.
- [9] E. Agency, "Land contamination risk management (LCRM)," 2023.
- [10] E. Agency, "Good Practice for Decommissioning Redundant Boreholes and Wells," 2012.

APPENDIX A – SITE PLANS



- Legend/Notes**
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
 - ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.

KEY:

- PLANNING APPLICATION BOUNDARY
- VEGETATION BUFFER TO REMAIN

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
P02	18/11/24	UPDATED TO ADDRESS CLIENT COMMENTS	JSBR	KM	KM
P01	31/10/24	FIRST ISSUE	JSBR	KM	KM

FOR INFORMATION S2



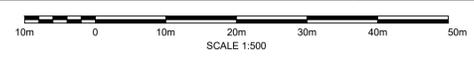
Contractor(s)

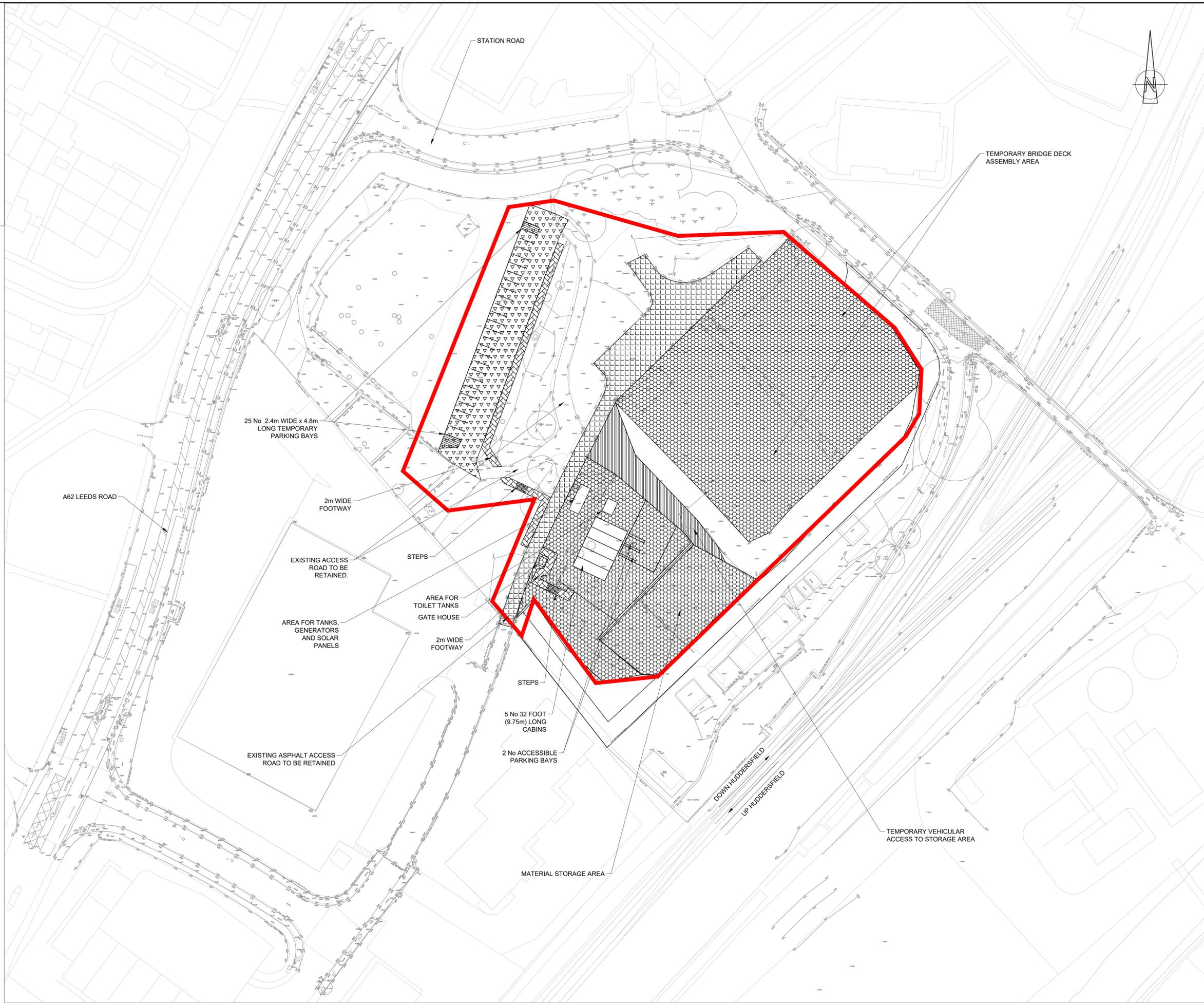
Tony Gee and Partners LLP
Consulting Civil, Structural and Geotechnical Engineers
4th Floor, Arthur House, Chorlton Street,
Manchester, M1 3FH
Tel: 0161 228 3033 www.tonygee.com

Transpennine Route Upgrade (TRU)

Drawing Title
BRADLEY JUNCTION
COMPOUND SITE
GENERAL ARRANGEMENT

Designed	J.Rose	Signed	Date	18/11/24
Drawn	J.Rose	Signed	Date	18/11/24
Checked	K.Mustapha	Signed	Date	18/11/24
Approved	K.Mustapha	Signed	Date	18/11/24
Scale(s)	1:500	ELR & Mileage	-	





- Legend/Notes**
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
 - ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
- KEY:**
- PLANNING APPLICATION BOUNDARY
 - EXISTING ASPHALT ROAD CONSTRUCTION TO BE RETAINED
 - TEMPORARY PERMEABLE CAR PARK
 - TEMPORARY PERMEABLE FOOTWAY
 - TEMPORARY ACCESS ROAD FORMED USING UNBOUND GRANULAR MATERIAL
 - TEMPORARY BRIDGE ASSEMBLY OR MATERIAL STORAGE AREA FORMED USING UNBOUND GRANULAR MATERIAL

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
P02	18/11/24	UPDATED TO ADDRESS CLIENT COMMENTS	JSBR	KM	KM
P01	31/10/24	FIRST ISSUE	JSBR	KM	KM

Status: **FOR INFORMATION** S2



Contractor(s)

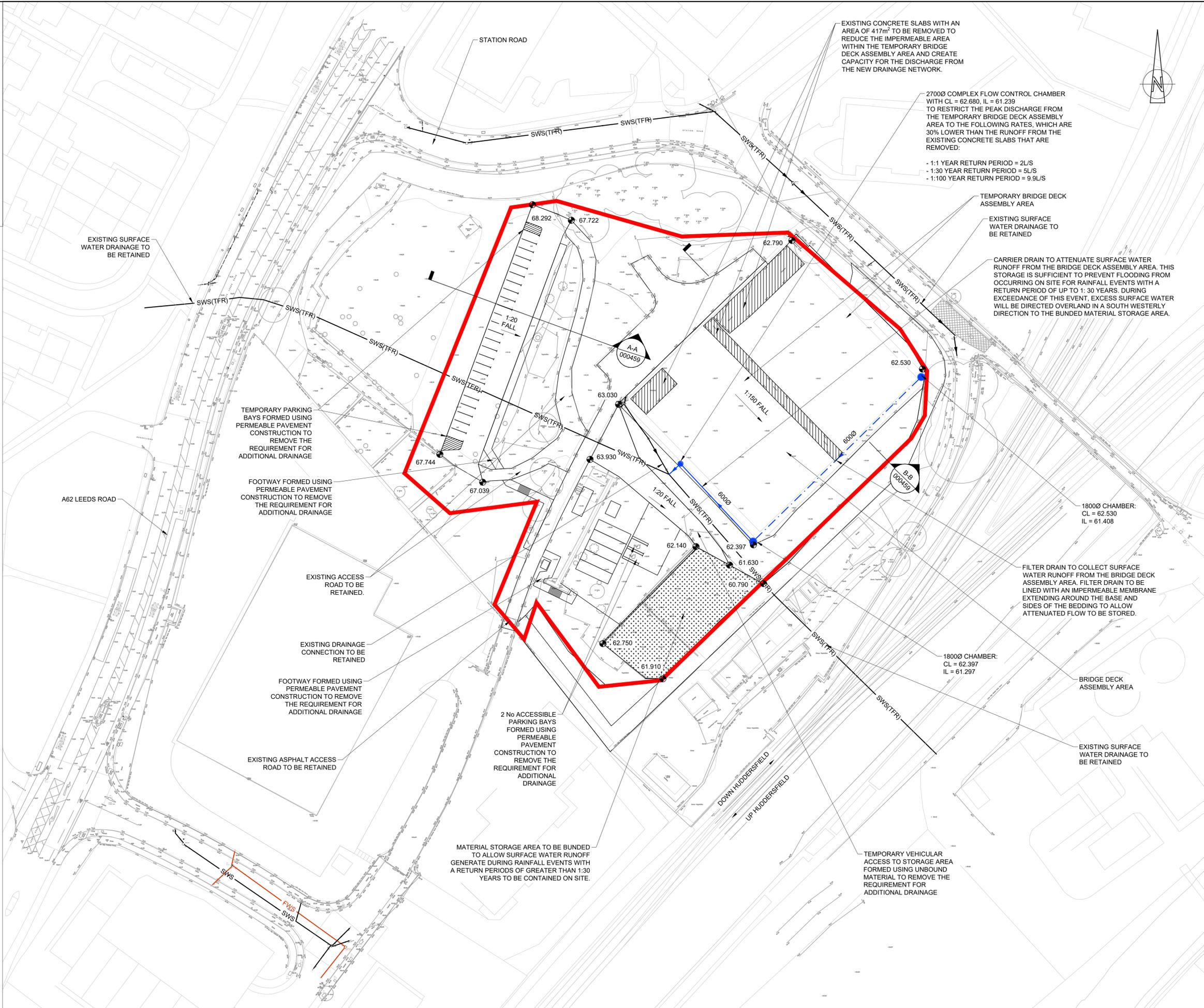
Tony Gee and Partners LLP
Consulting Civil, Structural and Geotechnical Engineers
4th Floor, Arthur House, Chorlton Street,
Manchester, M1 3FH
Tel: 0161 228 3033 www.tonygee.com

Project
Transpennine Route Upgrade (TRU)

Drawing Title
**BRADLEY JUNCTION
COMPOUND SITE
SURFACE FINISHES**

Designed	J.Rose	Signed		Date	18/11/24
Drawn	J.Rose	Signed		Date	18/11/24
Checked	K.Mustapha	Signed		Date	18/11/24
Approved	K.Mustapha	Signed		Date	18/11/24
Scale(s)	1:500	ELR & Mileage	-		





- Legend/Notes
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
 - ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
 - REFER TO DRAWING REFERENCE 151667-TSA-W3-MVL3-DRG-C-CV-000459 FOR CROSS SECTIONS.
 - THE FOLLOWING DRAINAGE STRATEGY IS REQUIRED TO ENSURE THAT THE WORKS WILL NOT INCREASE FLOOD RISK:
 - TEMPORARY PARKING BAYS, FOOTWAYS AND ACCESS ROADS WILL BE CONSTRUCTED USING PERMEABLE PAVING TO ENSURE THAT SURFACE WATER RUNOFF FROM THESE AREAS WILL NOT BE INCREASED.
 - BRIDGE DECKS WITHIN THE ASSEMBLY AREA WILL BE IMPERMEABLE. THE NEW DRAINAGE NETWORK ILLUSTRATED ON THIS DRAWING IS REQUIRED TO COLLECT AND ATTENUATE SURFACE WATER RUNOFF FROM THIS AREA FOR RAINFALL EVENTS WITH A RETURN PERIOD OF UP TO 1 IN 30 YEARS. RAINFALL GENERATED DURING MORE EXTREME RAINFALL EVENTS WILL BE DIRECTED TO THE MATERIAL STORAGE AREA IN THE SOUTHWEST CORNER OF THE SITE WHERE IT WILL BE CONTAINED.
- KEY:
- PLANNING APPLICATION BOUNDARY
 - GROUND LEVEL
 - EXISTING SURFACE WATER DRAINAGE
 - FILTER DRAIN
 - CARRIER DRAIN
 - CHAMBER
 - BUNDED MATERIAL STORAGE AND DRAINAGE AREA
 - EXISTING CONCRETE SLAB TO BE REMOVED

P02	18/11/24	UPDATED TO ADDRESS CLIENT COMMENTS	JSBR	KM	KM
P01	31/10/24	FIRST ISSUE	JSBR	KM	KM
Rev	Date	Description of Revisions	Drawn	Chkd	Appr
FOR INFORMATION					
					S2



Contractor(s)

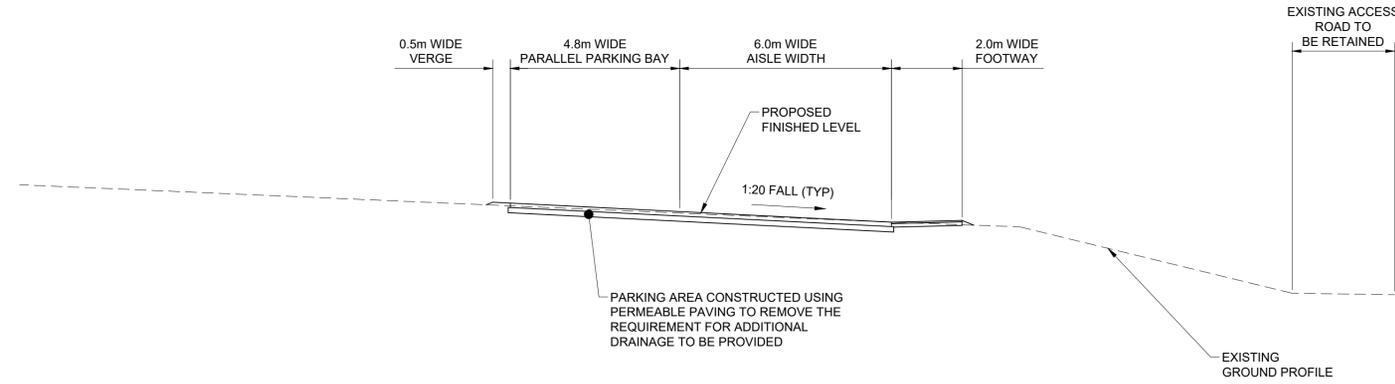
Tony Gee and Partners LLP
Consulting Civil, Structural and Geotechnical Engineers
4th Floor, Arthur House, Chorlton Street,
Manchester, M1 3FH
Tel: 0161 228 3033
www.tonygee.com

Project
Transpennine Route Upgrade (TRU)

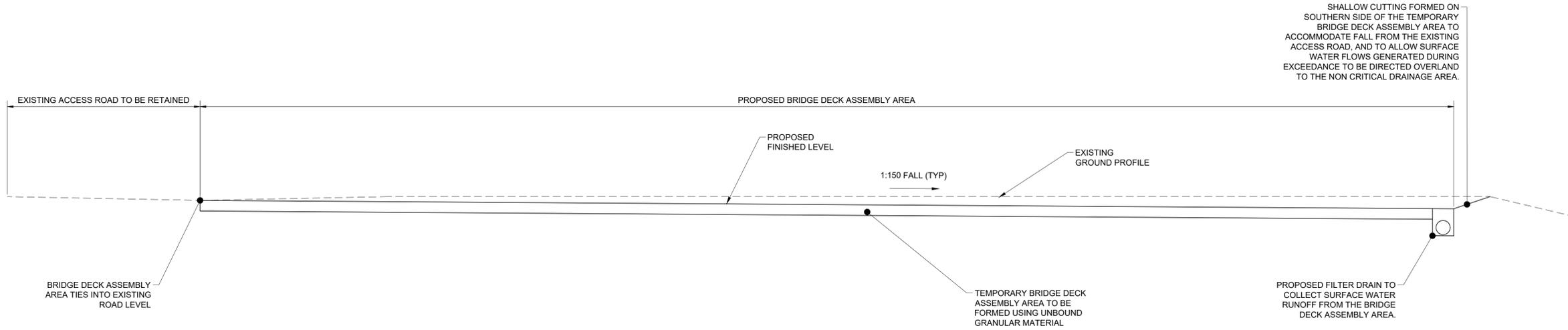
Drawing Title
**BRADLEY JUNCTION
COMPOUND SITE
LEVELS AND
DRAINAGE**

Designed	J.Rose	Signed		Date	18/11/24
Drawn	J.Rose	Signed		Date	18/11/24
Checked	K.Mustapha	Signed		Date	18/11/24
Approved	K.Mustapha	Signed		Date	18/11/24
Scale(s)	1:500	ELR & Mileage	-		





SECTION A-A
TYPICAL SECTION - PROPOSED TEMPORARY CAR PARK



SECTION B-B
TYPICAL SECTION - TEMPORARY BRIDGE DECK ASSEMBLY AREA



- Legend/Notes**
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
 - ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
 - REFER TO DRAWING REFERENCE 151667-TSA-W3-MVL3-DRG-C-CV-000458 FOR THE LOCATION OF CROSS SECTIONS.

KEY:

--- EXISTING GROUND LEVEL

— PROPOSED GROUND LEVEL

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
P02	18/11/24	UPDATED TO ADDRESS CLIENT COMMENTS	JSR	KM	KM
P01	31/10/24	FIRST ISSUE	JSR	KM	KM

Status: **FOR INFORMATION** Suitability: **S2**



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Project

Transpennine Route Upgrade (TRU)

Drawing Title

BRADLEY JUNCTION
COMPOUND SITE
PROPOSED CROSS SECTIONS

Designed	J.Rose	Signed	Date	18/11/24
Drawn	J.Rose	Signed	Date	18/11/24
Checked	K.Mustapha	Signed	Date	18/11/24
Approved	K.Mustapha	Signed	Date	18/11/24
Scale(s)	1:100	ELR & Mileage	-	

Alternative Reference	Sheet	1 of 1
Drawing Number	Revision	P02

APPENDIX B – SITE WALKOVER PHOTOGRAPHS

Bradley Nurseries – Site Walkover Photographs

JNP Group photographs (January 2023)



Site entrance.



View looking east.



View looking north.



View looking west.



View looking east.



View looking east.



View looking south.



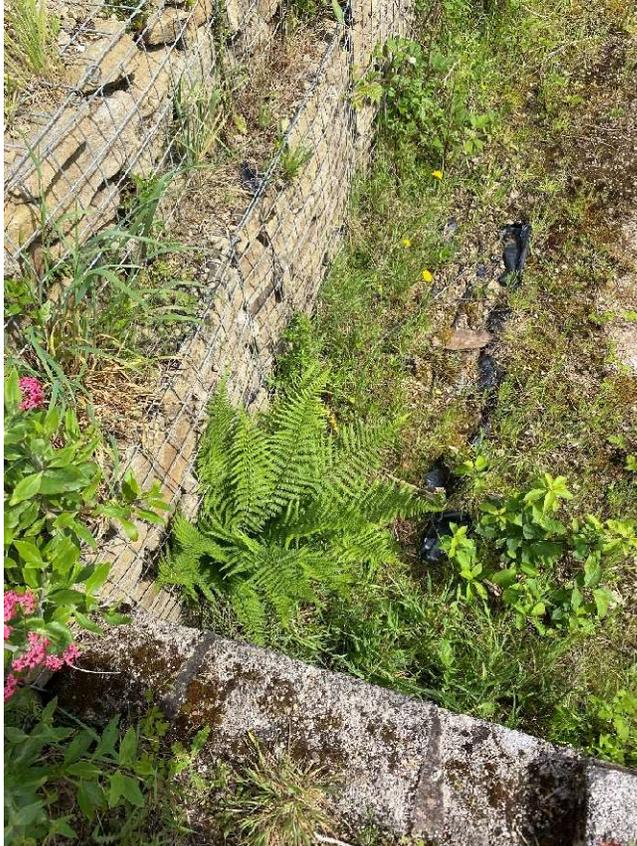
View looking south.

Waterman Infrastructure & Environment Ltd photographs (May 2024)



Building in east of site.







APPENDIX C – GROUNDSURE REPORT AND HISTORICAL MAPS

Document provided under separate cover

APPENDIX D – COAL AUTHORITY CONSULTANTS MINING REPORT



The Coal
Authority

Consultants Coal Mining Report

Harrison House, Station Road,
Bradley, Huddersfield, Hd2 1uw
West Yorkshire

Date of enquiry: 20 January 2023
Date enquiry received: 20 January 2023
Issue date: 20 January 2023

Our reference: 51003334641001
Your reference: GS-9309456



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

GROUNDSURE LIMITED

Enquiry address

Harrison House, Station Road, Bradley,
Huddersfield, Hd2 1uw
West Yorkshire

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

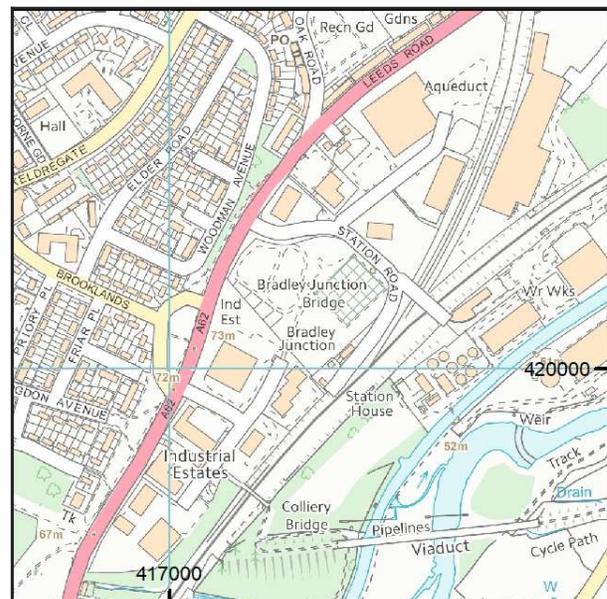
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BETTER BED	Coal	6076	9	Beneath Property	4.2	East	53	1852

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Adit	417419-001	417237 419957		Coal	
Shaft	417420-010	417077 420123		Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

M417	PO0	11045
------	-----	-------

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Fault under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

Distance to site investigation (m)	Direction
48.6	South-East
24.8	North
44.9	North-East

See Section 4 for further information.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

Site investigations

The site is within an area of previous interest. It is close to where the Coal Authority has received information relating to past site investigations.

The site requires further investigation and may influence how you approach your risk assessment.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

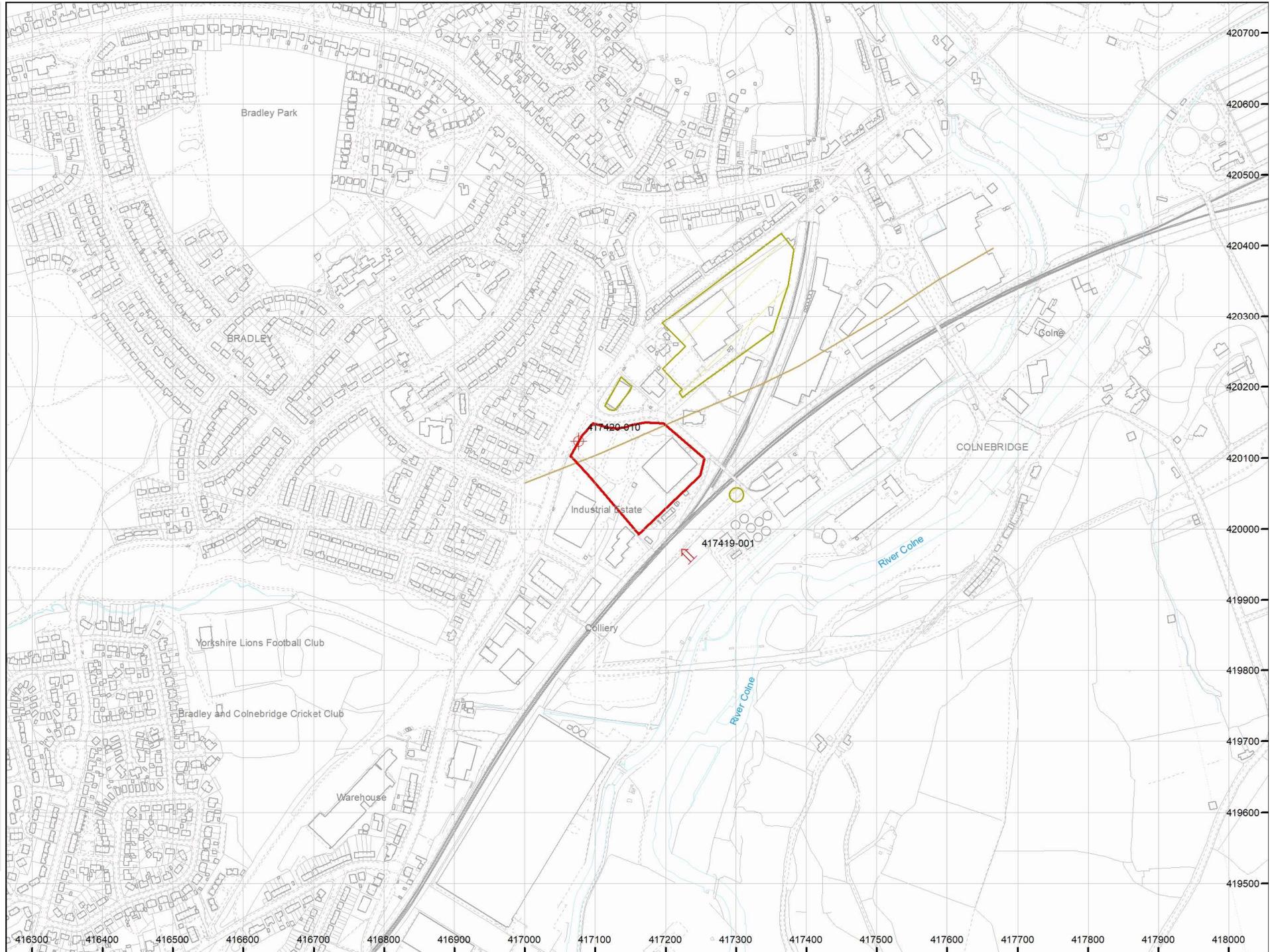
Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown 
- Disused mine shaft 
- Disused adit 
- Geological faults 
- Site investigations 



APPENDIX E – JNP GROUP PHASE II GEO-ENVIRONMENTAL REPORT

Document provided under separate cover

APPENDIX F – DEFINITIONS OF RISK PROBABILITY AND CONSEQUENCE

The assessment of risks related to the identified potential contamination linkages is based on the methodology presented in the National House Building Council/Environment Agency report R&D66¹ (that follows the principles presented in CIRIA's C552²), which provide guidance on the development and application of a consequence and probability matrix for land contamination risk assessment. Definitions of probability, consequence and the risk classification matrix adopted for this assessment are provided in the tables below.

Although R&D66 was produced to inform residential developments, the methodology and criteria for assessing contamination risks is applicable to other types of developments and provides more detailed classification descriptions than C552.

Classification of probability

Classification	Definition of the probability of harm/pollution occurring
High Likelihood	The pollutant linkage exists, and it is very likely to result in harm/pollution in the short term, and/or will almost inevitably result in harm/pollution in the long term, and/or there is current evidence of harm/pollution. Likelihood is defined as more likely than not and meets the definition of 'significant possibility' under Part 2A of the Environmental Protection Act (EPA)1990.
Likely	The source, pathway and receptor exist for the pollutant linkage and it is probable that harm/pollution will occur. Circumstances are such that harm/pollution is not inevitable, but possible in the short term and likely over the long term. Likelihood is defined as reasonably possible and meets the definition of 'significant possibility' under Part 2A of EPA 1990.
Low Likelihood	The source, pathway and receptor exist, and it is possible that harm/pollution could occur. Circumstances are such that harm/pollution is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the pollutant linkage, but it is improbable that harm/pollution will occur even in the long term.

Definition of consequence

Classification	Definition of consequence
Human health receptors – site end use or other more sensitive receptor	
Severe	Acute damage to human health based on the effects on the critical human health receptor. Concentrations of contaminants above appropriate site-specific assessment criteria. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Medium	Chronic damage to human health based on the effects on the critical human health receptor. Concentrations of contaminants above appropriate site-specific assessment criteria. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Mild	No appreciable impact on human health based on the potential effects on the critical human health receptor. Concentrations of contaminants above generic assessment criteria but below appropriate site-specific assessment criteria.

¹ National House Building Council (NHBC) and EA report R&D66 – guidance for the safe development of housing on land effected by contamination, 2008

² Construction Industry Research and Information Association (CIRIA) C552 – Contaminated Land Risk Assessment – A Guide to Good Practice 2001

Classification	Definition of consequence
Human health receptors – site end use or other more sensitive receptor	
Minor	No appreciable impact on human health based on the effects on the critical human health receptor. Concentrations of contaminants below appropriate generic assessment criteria.
Controlled water receptors	
Severe	Pollution of a Principal aquifer within a source protection zone or potable supply characterised by a breach of drinking water standards. Pollution of a surface water course characterised by a breach of an Environmental Quality Standards (EQS) at a statutory monitoring location or resulting in a change in General Quality Assessment (GQA) grade of river reach. Discharge of a List I or List II substance to groundwater. Pollution meets Part 2A definition.
Medium	Pollution of a Principal aquifer outside a source protection zone or a Secondary A aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Substantial pollution but insufficient to result in a change in the GQA grade of river reach. Pollution meets Part 2A definition.
Mild	Low levels of pollution of a Principal aquifer outside a source protection zone or an industrial abstraction, or pollution of a Secondary aquifer. Low levels of pollution insufficient to result in a change in the GQA grade of river reach, pollution of a surface water course without a quality classification.
Minor	No appreciable pollution, or pollution of a low sensitivity receptor such as a non-aquifer or a surface water course without a quality classification.
Property receptors – buildings, foundations and services	
Severe	Catastrophic damage to buildings, such as explosion. Catastrophic failure of foundations and services. Substantial damage to a Scheduled Monument significantly impairing the by reason of which the monument is scheduled. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Medium	Substantial damage to buildings and foundations rendering the structures unsafe. Substantial damage to services impairing their function. Significant damage to a Scheduled Monument significantly impairing the reason of which the monument is scheduled. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Mild	Significant damage to buildings and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function. Damage to a Scheduled Monument but no significant impairment to the reason of which the monument is scheduled.
Minor	Easily repairable damage to buildings, foundations and services.

Classification of consequence

Classification	Definition of risk
Very High Risk	There is a high probability that severe harm may arise to a designated receptor or there is evidence that severe harm to a designated receptor is currently happening. This risk is likely to result in a substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not already undertaken) is required, and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	It is possible that harm may arise to a designated receptor. It is either relatively unlikely that any such harm will be severe, or if any harm were to occur, it is more likely that the harm will be relatively mild. Investigation (if not already undertaken) is normally required to clarify

Classification	Definition of risk
	the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	It is possible that harm will arise to a designated receptor, but it is likely that this harm will be mild. Further investigation is not necessarily required and should be considered to confirm that there is no unanticipated contamination present.
Very Low Risk	The possibility of harm to the designated receptor is either not plausible or, if the possibility of harm is plausible, risk is considered to be very unlikely with attenuation along the exposure pathway. Further investigation is not necessarily required and may be considered to confirm that there is no unanticipated contamination present.

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